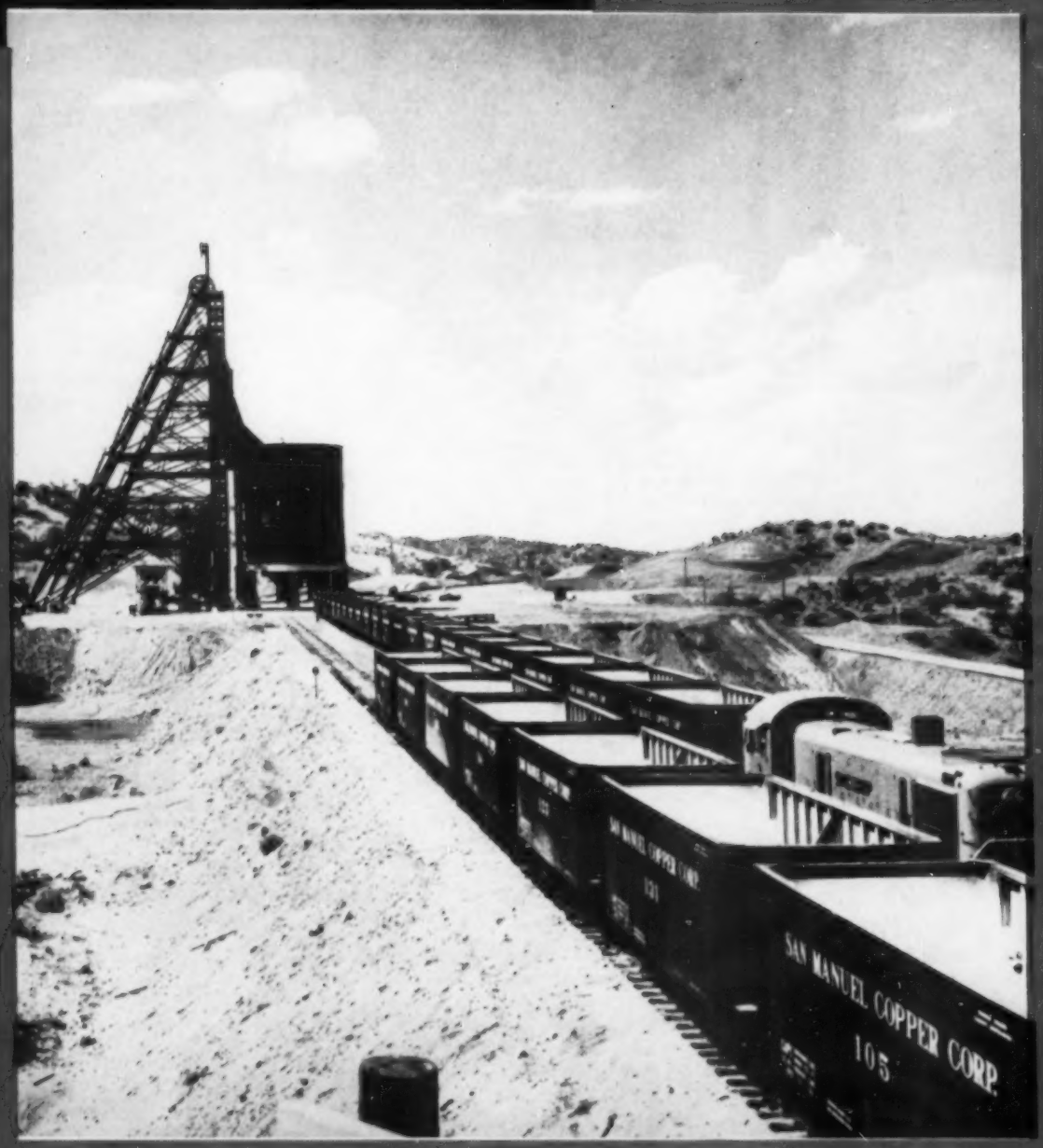
SEPTEMBER 1956 Vol. 18 No. 10

MINING WORLD



Full Report on San Manuel's Block Caving
Page 74

50 cents a copy—3s 6d in sterling

12 84" WEMCO S-H CLASSIFIERS

chosen by the White Pine Copper Company

One of 12 Wemco S-H Classifiers installed by White Pine Copper Co. at White Pine, Michigan following testing in their company pilot plant. Mining and processing operations for this large project were designed and engineered by the Western Knapp Engineering Company, division of Western Machinery Company.

With annual production of 75 million pounds, White Pine ranks as one of the most important copper projects developed. To serve as a vital part of the primary grinding circuit, White Pine selected twelve 84" Wemco S-H Classifiers. Typical of the magnitude of this project is the fact that these 84" units are the world's largest simplex classifiers.

Six pairs of Wemco S-H Classifiers are operated in closed circuit with six ball mills, 12' 6" x 13' in size. The minerals recovered are chalcocite and minor amounts of native copper occurring in sandstone and shale deposits. Each classifier is of the submerged spiral type of design with 84" double ribbon, variable pitch spiral. Inside tank length totals 41' 9". Operating slope is 3½" per foot.

Each classifier has sand raking loads up to 8000 TPD and overflows feed to flotation at rates up to 1200 TPD. Classifier overflow ranges between 30 and 35% solids (depending on degree of pulp flocculation). Screen analysis of this overflow shows between 2 and 8% plus 100 mesh.

Whether your classifier needs are large or small WEMCO DESIGN offers you these METALLURGICAL AND MECHANICAL ADVANTAGES

- **Greater Overflow Capacity** — up to 25% more effective pool area.
- **Greater Raking Capacity** — up to 100% greater sand conveying capacity.
- **Sharper Separation** — less oversize in the overflow and less undersize in the sands.
- **Greater Mechanical Strength** — through Wemco-pioneered large diameter shafts.
- **Balanced Performance** — various models with a wide choice of tanks and spirals achieve correct performance under any condition.
- **Better Drainage** — drier sand for easier conveying and close-circuiting.

Put Wemco to work on your classification problems. Write today for current literature and additional information. No cost or obligation.

WKE

WESTERN KNAPP ENGINEERING CO.
a division of . . .

WEMCO
WESTERN MACHINERY COMPANY

760-B Folsom Street • San Francisco 7, Calif.

Representatives in principal cities of the United States and Canada and in major countries throughout the world.

In California...and the World Over Bucyrus-Eries Live Up to Reputation for High Output

Bucyrus-Erie 6-yd. 150-B shovel working at Eagle Mountain mine. Ore bearing formations here are high in iron content and considerably heavier than most rock.

Miners the world over have learned to expect outstanding performance from Bucyrus-Erie Ward Leonard electric shovels — and they get it, no matter how tough the assignment.

The machine above, for instance, is on a California project where it handles massive, heavy iron ore and waste rock — an extremely hard, fine rock which is quite abrasive. It's a true test of an excavator's strength and durability but here, as on other tough jobs the world over, the Bucyrus-Erie shovel moves big yardages economically — day after day, month after month.

It's the *extra margin of quality,* both in design and manufacture, that qualifies Bucyrus-Erie Ward Leonard electric shovels for world-wide acceptance — and lets them live up to it. We would like the opportunity of explaining that extra margin of quality — and what it can mean in performance on your job. 119L56

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN

See us at the MINING SHOW
BOOTH 516, Shrine Auditorium
Los Angeles, Calif., Oct. 1-4

GRAB SAMPLES From the Mail

These Are Correct U_3O_8 Dates

Dear Sir:

In reading the article "AEC Extends Uranium Procurement Program through 1966" on page 71 of the July 1956 issue of MINING WORLD, we noticed that in the second paragraph you have incorrectly given the date for the beginning of the new procurement program as March 31, 1956. The correct date is March 31, 1962. This error is repeated in the seventh paragraph, where the statement is made that 'Vanadium purchase commitments will not be made after March 31, 1956 by the AEC." Here again the correct date is March 31, 1962.

Trust you will call this to your readers' attention in a future issue.

JESSE C. JOHNSON
Director
Division of Raw Materials

Forward Fullest Details

Dear Sir:

In the MINING WORLD issue of April 16, 1956 you show a picture of a pneumatic charging machine.

Would you please forward us fullest details possible on this machine. The reason we ask for this in a letter instead of using the PEP card is that we have to supply full details of any equipment used in connection with explosives to the Queensland Department of Mines for approval. We also have to supply details to obtain an Import License.

Our explosives are 1 and 1¼ inch in diameter by 8 inches long, 1¼ by 23 inches, and 2 by 17½ inches.

J. W. FOOTS
General Manager
Mount Isa Mines Limited
Queensland, Australia

Drilling In Dense Jungle

Dear Sir:

No doubt the enclosed PEP card has passed its termination date. However I hope you will arrange to send me the information on the core and drill bit selector. I am drilling in such dense jungles that the ways of transport are not at all practical and no proper arrangements for mail in floody areas.

A. P. SINGH
Driller, Geologic Survey of India
Hazaribag, Bihar
India

Benefit of Civilized Mankind

Dear Sir:

Your worldly famous mining magazine WORLD MINING gives us the news of modern mining throughout the world, and also the activities of the men who are bringing the buried underground minerals to the surface to be utilized for the benefit of civilized mankind in modern daily life.

A few years ago it was a great honor for us to have the WORLD MINING editor, Mr. George O. Argall, Jr., visit our main office in Seoul, Korea. We were very interested in his valuable experience in mining throughout the world, especially in the Orient. We appreciate very much the article he wrote about our company's Ulchin tin and lithium mine and our monazite mine.

DU W. CHOY
Sir Dae Moon Ku
Seoul, Korea

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 18 **SEPTEMBER 1956** NO. 10

OPERATIONS—TECHNOLOGY

IN THE NEWS

DEPARTMENTS

ON THE COVER: San Manuel Copper Corporation's twin ore hoisting shafts. The 18.5-ton capacity bottom dump skips discharge into a 5,000 ton bin at each shaft. Trains of 30 cars with each car having a capacity of 100 tons are spotted underneath the bins for loading.

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HOUSE ROLLS are automatically built up with 2 or 3 passes of Stoody 104.

How one of the country's large contracting firms MAINTAINS SHOVEL PARTS

The shovel parts illustrated here are typical of those regularly rebuilt and hard-faced by George M. Brewster and Son, Inc., famous for the big jobs handled, such as the New Jersey Turnpike and approaches to the George Washington Bridge. Standard maintenance practice includes complete restoration of worn house rolls, buckets, bucket teeth, pads and tumblers.

After rebuilding, the Stoody 104 deposit is machined to original size. This is one of the few parts requiring machine work. Others go into service "as-welded."

In the Brewster operation Stoody Hard-Facing Alloys are used for both manual and automatic applications. They help to keep equipment in service longer between repair periods and reduce the number of replacement parts that must be stocked. Life of rebuilt parts is invariably equal to or greater than the original equipment—yet the cost of rebuilding and hard-facing is but a fraction of new part costs.

Procedures followed here and by other major earth-moving contractors are described in detail in the Stoody Hard-Facing Guidebook and other Stoody literature; consult your Stoody dealer (see the "Yellow Pages" of your phone book) or write direct for full information.

WORN SHOVEL PADS. Conventional treatment includes rebuilding worn areas with Stoody Manganese and manually hard-facing with Stoody 1027.

OTHER SHOVEL HARD-FACING APPLICATIONS

Besides the applications shown, Stoody Hard-Facing Alloys are regularly used all over the nation for rebuilding and protecting Shovel Idlers, Drive Tumblers, Boom Heels, Latch Bars, Latch Plates, Buckets and Bucket Teeth. Wherever there's wear, you'll find effective prevention with STOODY ALLOYS!

STOODY COMPANY
11969 East Slauson Avenue
Whittier, California

Drifts and Crosscuts

Stop In Salt Lake City

Machinery manufacturers and their sales and engineering staffs will converge on Los Angeles, California the first of October to display their equipment to the western mining industry at the Metal Mining Exposition. Eastern mining officials will be heading west at the same time.

This is directed to those of you coming to the mining west for the Exposition. Don't overlook the important and informative Rocky Mountain Minerals Conference in Salt Lake City, September 26, 27, and 28.

It won't cost you a dime extra to route your ticket through Salt Lake City with stop-over privileges. The value of what you learn can't be measured by many many dimes.

Save Your High-Grade Uranium Ore

There is no question that the recent extension of the United States Atomic Energy Commission's uranium buying program has met with general favor for obvious reasons.

However, the initial concern expressed for and by the small miner without a mill who must sell ore to the Commission or to a larger milling company is unwarranted.

Think it over. The mine operator with ore, and all the better if it's good ore, will be in a favorable position. Here are several reasons why. First, the price for concentrate after April 1962 at $8.00 per pound is lower than today's concentrate price. In other words, even before the increased operational costs due to inflation, the uranium will be less valuable per pound. The natural consequence, and it's so practiced today, is to stretch ore bodies and blend in as much low grade as possible while the higher price prevails.

This means less mineralized rock will be ore grade and minable after 1962. The miner with ore will be sought by the milling company fortunate enough to be able to operate under the $8.00 price. The mill will need good grade ore and the miner can negotiate his ore sales.

There isn't now and there won't be after 1962 an appreciable cost difference per ton in treating 0.15 to 0.42 percent U_3O_8 ore. However, with exploration, plus development, plus mining, plus freight, plus milling costs, together with overhead and taxes, the cost to produce a pound of concentrate may well be above $8.00. The one big out the milling company will have is treatment of higher grade ore. Milling costs will be up, true; but not so proportionately as mining costs. Therefore, the milling company will be placed in the position to pay premiums for high-grade ore.

This is why the miner with ore will be in a key spot. He can negotiate with the mill, make a deal to split the increased profit as the ore grade goes up.

All of which makes a nice mining problem.

Ship all the low grade you can blend in today.

Save all the high grade you can for tomorrow.

Don't count the miner out now.

The Rush For Titanium Minerals

Both here in the United States and in Australia, the easy-money, get-rich-quick, uranium boom has slowed. However, the less heralded titanium raw material boom grows.

In the United States, both coasts of Florida and the ancient beach sands now elevated above and several miles from today's beach line are the main sources of rutile—the primary titanium ore mineral.

Florida beach sand mining is done by Humphreys Gold Corporation (for E. I. du Pont Company), Continental Mineral Process Corporation, Florida Minerals, Rutile Mining Company of Florida, and the Titanium Division of National Lead Company. Exploration work has been done by Bear Creek Mining Company, the exploration subsidiary of Kennecott Copper Corporation, and by Union Carbide and Carbon Corporation. Du Pont, National Lead, and Union Carbide all control titanium metal plants. Kennecott is actively interested in producing titanium.

In Australia, the world's largest producer of Rutile, a real beach boom is on. New companies have been formed, base metal producers are expanding their holdings in rutile, and uranium-oil-tin prospecting groups are actively seeking leases. Claims cover miles of beaches and now extend off shore. Even Whale Industries, Australia's largest fish catching firm, has joined with Zircon Rutile Ltd. to test leases on Moreton Island. Incidentally, National Lead's Titanium Division is one of the important producers.

All this has resulted in a terrific clash between mining companies and beach conservatists-nature lovers-beach combers. . . . the latter group fighting to prevent mining with the false claim that beaches will be destroyed forever when actually the next high tide after mining washes in a new supply of sand—and rutile too.

But why this rush from glamorized uranium?

There are several reasons: Rising demand for rutile. Increased selling prices for rutile. Low prospecting cost. Low mining cost. Low plant equipment cost. The latter certainly is attractive when today's modern uranium mill costs about $10,000 per daily ton of capacity. Contrast this with less than $100 per ton for rutile.

Capitol Concentrates

How Congress Extended The Program For Purchase of Domestic Minerals

After the strategic mineral bill S. 3982 had become Public Law 733, 84th Congress, 2nd Session, the only difficulty that remained was the lack of money with which to buy the minerals. Work on the Second (and last) Supplemental Appropriation Bill had already been completed by the House Appropriations Committee where money bills originate. S. 3982 is the bill which authorized and established purchase programs for specified quantities of tungsten, asbestos, acid-grade fluorspar, and columbium-tantalum ores and concentrates during the period ending not later than December 31, 1958.

In the closing days of the Congress, due to the efforts of Western Senators, the Senate Appropriations Committee received justification from the Interior Department and the Bureau of the Budget for $91,000,000 to carry the program through for the authorized 2½ years. As such a large sum generally is voted in the regular appropriation bills, the Senate committee put $35,000,000 in the bill to carry through until next year. However, much to the surprise and consternation of those interested in the mineral bill, the House conferees on nearly the last day of the session refused to go along with the Senate and the bill was passed in the House with no funds for buying minerals. That would have meant a long, dry spell waiting seven months for money, and undoubtedly a lot of mines would have had to close.

When the conference report reached the Senate, Senator Hayden of Arizona, by a lot of clever manipulating, managed to get the Senate to reject the bill (which called for more than $2,500,000,000) and send it back to conference, thus preventing congressional adjournment for another day. Under this pressure a compromise figure of $21,000,000 was arranged and the new conference report passed both Houses just before adjournment. It appears that this amount will be sufficient to carry the program until the early days of the 85th Congress when, it is understood, the balance will be provided for in the first regular appropriation Bill.

Under S. 3982, which became Public Law 733, the Department of Interior was made the administering agency and the purchases are financed from general funds rather than from Defense Production Act funds. Expiration date is not later than December 31, 1958. The act authorizes the following purchases:

For tungsten: 1,250,000 short ton units of WO_3 at $55.00 per unit f.o.b. carriers conveyance. The quantity of tungsten which will be purchased is limited to 5,000 short ton units monthly originating in any one mining district from properties controlled by one producer;

For asbestos: 2,000 tons of crude nonferrous chrysotile asbestos of grades No. 1 and No. 2 combined, and 2,000 tons of grade No. 3 if offered with either or both higher grades in a ratio not exceeding 1 to 1;

For fluorspar: 250,000 tons of newly mined acid-grade fluorspar at $53,000 per short ton f.o.b. carrier's conveyance at producer's milling point;

For columbium-tantalum: 250,000 pounds of columbian-tantalum meeting the same specifications and at the same prices in effect on December 1, 1955.

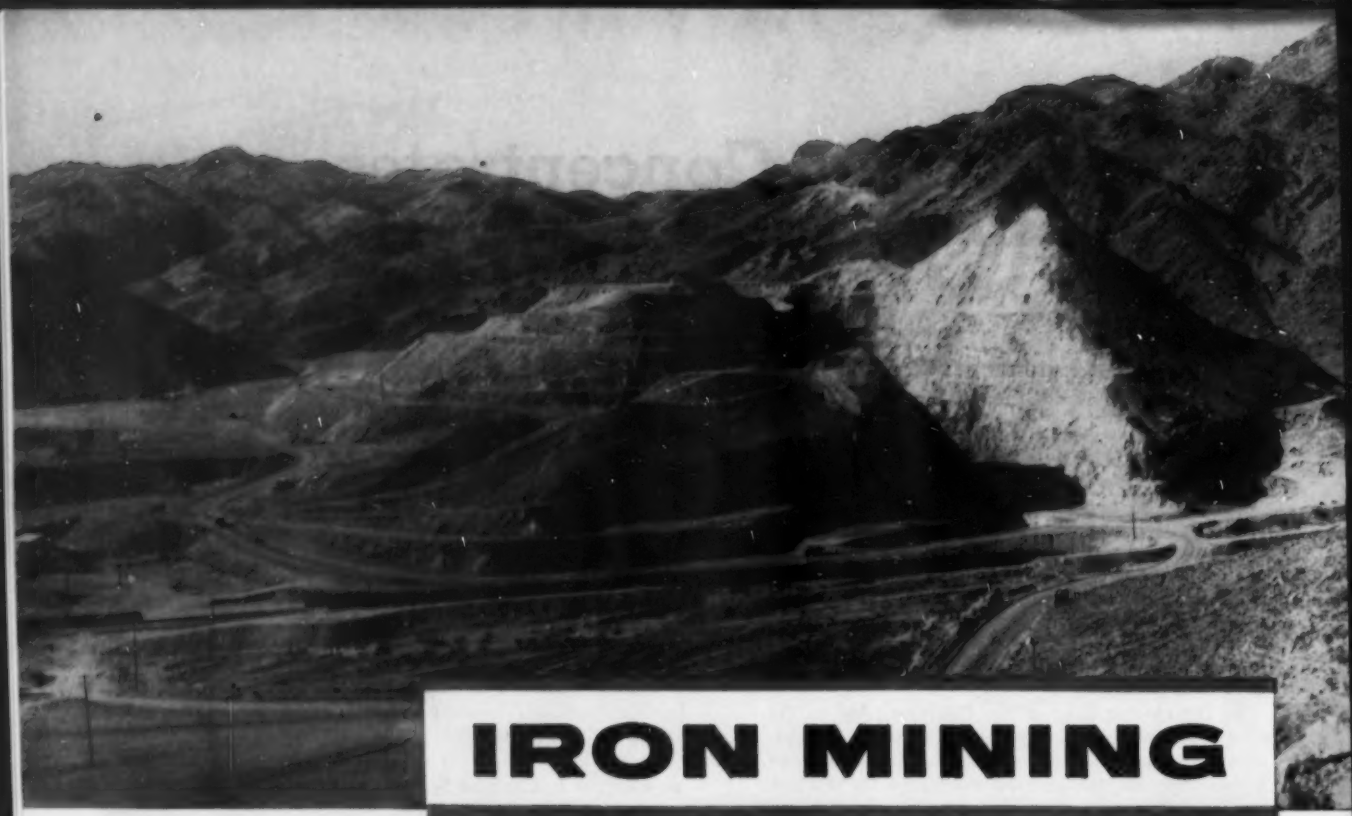
• Interior Is On The Spot

It is interesting to note that the domestic strategic minerals bill passed by the Congress places the responsibility for administering such purchase programs as are not classified for defense purposes squarely up to the Department of the Interior. This department has resisted such responsibility, but the provision to make the Interior Department the administering agency (contained in a House amendment) was generated in the Bureau of the Budget, according to informed Washington circles.

Members of the Senate Interior Committee for a long time have maintained that the Interior Department should be responsible for maintaining the non-defense economics of domestic mining in a healthy condition. This position was reflected in the so-called "bonus" bill introduced by some 30 Senators, and which the Interior Department disliked very much. Anyway, the House amendment was the first indication that the Administration as well as the Congress realizes the responsibility of the Interior Department to the domestic mining industry.

• Stockpile Purchase Directive Is Issued

Arthur S. Flemming, director of the Office of Defense Mobilization, has issued a directive authorizing the General Services Administration to procure various strategic materials, principally minerals, for the fiscal year ending June 30, 1957. As is usual, this directive specifies a domestic preference by saying that none of the materials is to be obtained from foreign sources if it can be purchased from domestic production.



General view of Kaiser Iron Mine at Eagle Mountain, California.

IRON MINING
In California

Kaiser Steel Uses "Eucs"

22 ton "Euc" with quarry body being loaded by 5 cu. yd. shovel.

Dumping 22 tons of ore into crusher for processing and rail shipment to Fontana Plant of Kaiser Steel Corporation.

IRON ORE for the big Kaiser Steel plant at Fontana, California, comes from an open pit mine in the Eagle Mountains between Indio and Blythe. Mining operations began in July of 1948 with 11 Rear-Dump "Eucs" of 15-ton capacity removing overburden, stockpiling low grade material and hauling top grade ore from loading shovels to the main crusher.

Performance of the original Euclid fleet was so dependable and efficient that Kaiser now uses 15 "Eucs" of 22-ton capacity with 5 of the 15-ton units. Loading shovels have 4½ and 5 cu. yd. buckets . . . hauls from bench to crusher have long grades of minus 8%. Despite big loads and steep downhill hauls, speed is controlled without excessive use of the service brakes by means of retarding units that maintain maximum safe travel speeds at all times.

If you have a problem of moving large tonnages on tough off-the-highway hauls, ask your nearby Euclid distributor for helpful facts and figures. He may be able to help you reduce costs, and besides, he's a good man to know!

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

This restriction sounds very good to the public. The gimmick is that, with the exception of a very few materials, the purchase directives also will specify that procurement will be only at market prices, i.e., the World or freemarket price. As most domestic producers cannot sell at such prices, the effect will be that ODM, through GSA, will procure most of the stockpile material abroad as usual. An amusing note in connection with this latest ODM stockpile directive is that opium is included in the list of materials GSA is authorized to purchase abroad only if it cannot be "purchased from domestic production."

• Senate Interior Plans Varied Program

Informed sources in Washington state that the Senate Committee on Interior and Insular Affairs, when Congress adjourns, will put into preparation a number of interesting staff reports. Among them will be:

A new report bringing the last staff report on titanium up to date;

A report on the mineral resources of the Antartica;

A report on the mineral resources of the Soviet Union and the Satellite countries; and

An analysis of the situation of various critical metals which are alloy components of jet engines.

There also is a possibility that field hearings may be held by one of the Senate Interior sub-committees this summer on the economic conditions in the gold mining industry. Under investigation will be the desirability of passing the Magnuson-Pfost resolution which would set up a special Congressional committee to study the problems of domestic gold mine owners.

• Purchase Programs Are Really Contracts

While testifying about his extension by executive order of certain strategic mineral purchase programs, ODM Director Flemming was asked if the orders are revokable. Flemming remarked, "Only by the director of the Office of Defense Mobilization. But I cannot conceive of anyone's taking such action because he would open the government up to the charge of bad faith immediately . . . It seems to me that comes as close to a formal contractual arrangement between the government and industry as you possibly could get."

COMING CONVENTIONS

September 24 through 28. Annual conference and machinery exhibit of the ATOMIC INDUSTRIAL FORUM, Navy Pier, Chicago, Illinois.

September 26, 27, 28. Annual ROCKY MOUNTAIN MINERALS CONFERENCE, AIME, Salt Lake City, Utah.

September 30 through October 2nd. Joint convention and co-exposition of the AMERICAN MINING CONGRESS ON SURVEYING AND MAPPING and the AMERICAN SOCIETY OF PHOTOGRAMMETRY. Shirley Savoy Hotel, Denver, Colorado.

October 1 through 4. Mining show and exposition of the AMERICAN MINING CONGRESS, Shrine Hall, Los Angeles, California.

October 11, 12, and 13. Sixth annual DRILLING SYMPOSIUM, University of Minnesota's Center for Continuation Study, Minneapolis, Minnesota.

November 1, 2, 3. Annual convention of the NEW MEXICO MINING ASSOCIATION, Carlsbad, New Mexico.

November 8, 9, 10. NORTHEASTERN MINING CONFERENCE AIME, Lehigh Valley Section of the AIME as host. Hotel Hershey, Hershey, Pennsylvania.

Wide bowl-opening on Rear-Dump provides easy entry, big target for shovel, dragline, or conveyor loader. Units come in 11, 22, and 35-ton capacities.

Smooth, streamlined, unobstructed body dumping at 66° angle readily sheds sticky material.

Hauls to overburden dump are made at speeds up to 32 mph by this C Rear-Dump.

Big-tire haulers beat mud problem

A Canadian company had the problem of stripping 30 to 75-ft. layer of wet clay out of rock pockets. Soft and sticky with trapped-in moisture, this overburden was loaded by draglines, and hauled half a mile to waste dumps. Four C Tournapull Rear-Dumps were used to speed hauling.

Exceptional mud-ability

As owners everywhere have found, Tournapull Rear-Dumps go through mud which stops conventional truck-type haulers. On this overburden job, for example, these Rear-Dumps worked out of deep mud-holes in the pit and off dumps so soft a man could not walk through them. The exceptional mud-ability they showed is due partly to traction of big 21.00 x 25 low-pressure tires... partly to electric power-steer through geared kingpin which "walks" Tournapulls out of trouble... partly to exclusive differential which *automatically* transfers power from slipping wheel to wheel on firmer footing.

On rough haul-roads, Rear-Dumps with 5'6" diameter tires haul faster than trucks. The big tires grip and roll over the bumps, cushion machinery and operator from road shocks.

Turn around non-stop

These Rear-Dumps also work faster and with greater safety in narrow quarters than conventional haulers. They turn around in much less space. When bowl is raised, they shorten wheel-base to turn non-stop in an area about 1/3 less their overall length. This maneuverability speeds haul on narrow roads, reduces spotting time at shovel and dumps.

Dump fast and clean

Practically no clean-up is needed on the dump. With front-wheel drive, Rear-Dumps back safely to edge of bank. Bowl swings behind and below rear wheels... loads fall free and clear over the edge, with little spillage, seldom call for clean-up.

Ask your LeTourneau-Westinghouse Distributor to show you first-hand how Rear-Dump advantages can pay off on your work.

Rear-Dumps now available with optional tailgate.

Tournapull—Trademark Reg. U.S. Pat. Off. R-982-G-bw

LeTourneau-WESTINGHOUSE Company

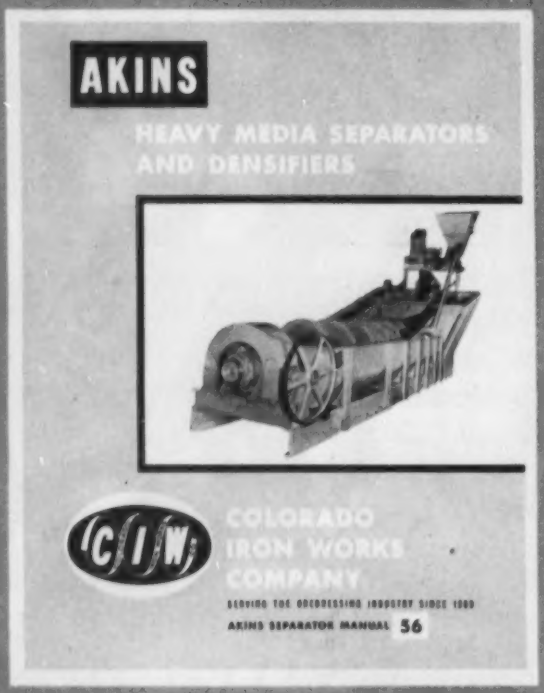
Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

NEW MANUAL on heavy media

SPIRAL SEPARATORS and DENSIFIERS

Experimentation on use of the Akins Spiral Classifier in making a sink and float separation was first started in 1938. In 1944 the first commercial 78" Akins Separator was placed in successful operation by one of the large iron mining companies. Since then there have been many developments and refinements, mechanically and metallurgically, in the Akins Separator and the HMS process. This new manual is a complete presentation of these developments and includes the latest data on heavy media spiral separators and densifiers...



- development of spiral HMS separators
- discussion of metallurgical and mechanical operation of spiral separators
- handling of middlings
- how the Akins makes a 3-product separation with one medium circuit
- operating data showing actual results
- purpose of the densifier and how it works
- flowsheets
- capacities and engineering data on Akins Separators and Densifiers
- operating and control instructions

PILOT PLANT TESTING SERVICE AVAILABLE

CIW has a 12" Akins Separator at the Colorado School of Mines Research Foundation which is available for conducting pilot tests.

For a copy of MANUAL 56 *just write to...*

Akins — the ORIGINAL spiral type classifier.

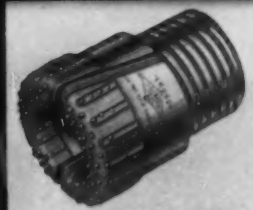
COLORADO IRON WORKS CO.

1624 17th Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

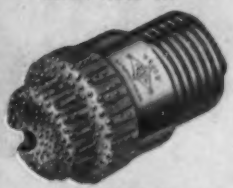
Sales Agents and Licensed Manufacturers in Foreign Countries

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.

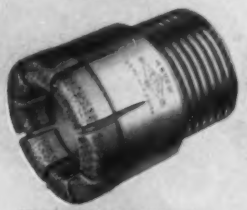


TRUCO CORING BIT

TRUCO CONCAVE BLAST HOLE BIT



TRUCO PILOT BIT



TRUCO IMPREGNATED CORING BIT

TRUCO REAMING SHELLS

TRUCO STANDARD OIL FIELD BIT

FINEST QUALITY DRILL BORTZ

1910 *Our 46th Anniversary* **1956**

man on the wing

Great things were happening in aviation 45 years ago when we launched the idea of scientifically selected industrial diamonds and set up our little factory to make the diamond tools that were to be so vital to aviation.

Louis Bleriot had won $5,000 offered by London Daily Mail for the first airplane flight across the English Channel. Piloting his 24 H.P., 450 pound monoplane to the dizzy height of 250 feet, he had spanned the 21 miles of open water in 37 minutes. The challenge echoed across the Atlantic and 1910 saw a brilliant parade of dramatic "firsts."

Glenn Curtis won $10,000 offered by New York World in a 150 mile race with a train. Charlie Hamilton won $10,000 offered by New York and Philadelphia newspapers for flying a round trip between those cities in one day. Walt Brookins won $5,000 offered by Atlantic City Aero Club for reaching a height of one mile.

Ely took off from the deck of a cruiser and flew two miles to Norfolk in the first ship take-off flight. Phil Parmalee got $5,000 for flying five bolts of silk from Dayton to Columbus, Ohio, in a store publicity stunt—the first merchandise shipped by air.

Another first in those early years was Engineered Diamond Tools followed, later, by Truco Engineered Diamond Bits containing the finest selected diamonds, hand set to bring each sharpest cutting face to the work. In virtually every major drilling operation in the world these bits are now famous for fast, accurate and dependable penetration in every formation and for their ability to reduce rig time and footage costs. May we send you a copy of the Truco Diamond Bit Catalog?

TRUCO DIAMOND BITS

by

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue, Detroit 38, Michigan

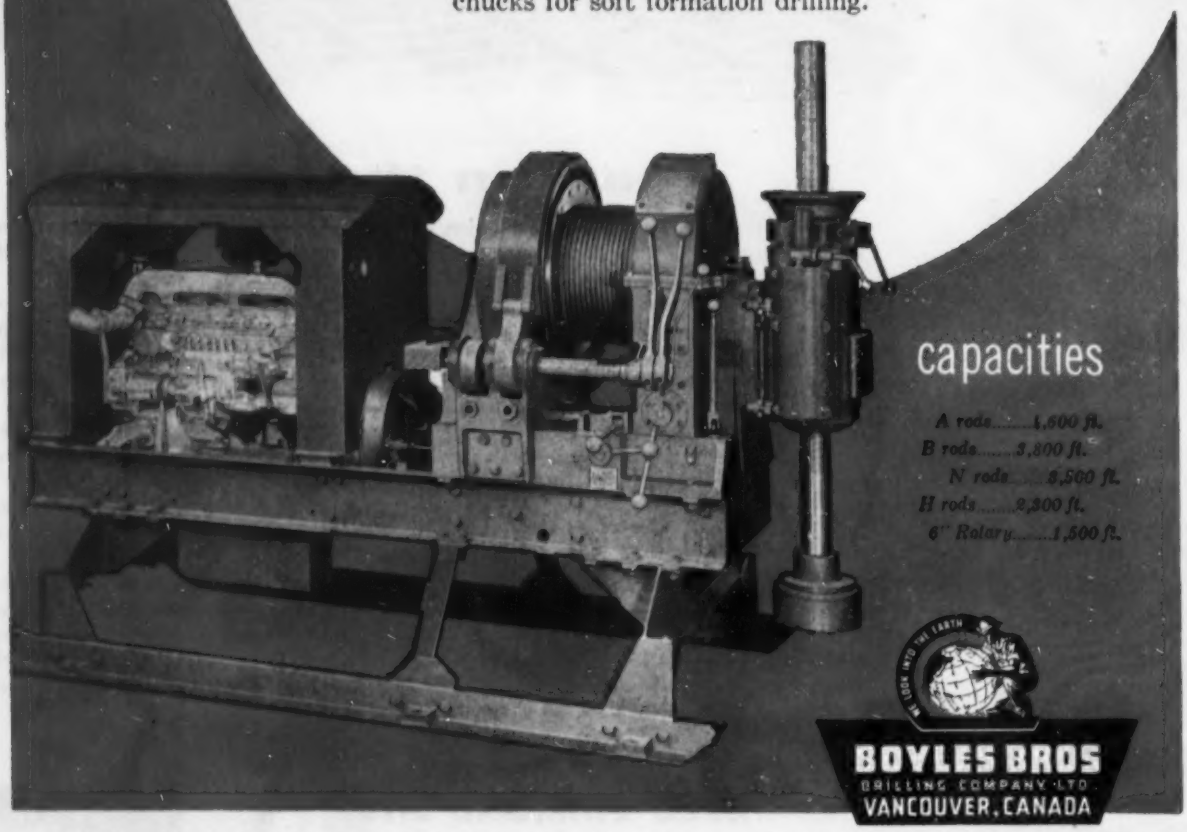
WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada

See our exhibit at Booth 615, A.M.C. Mining Show, Los Angeles, Oct. 1-4

now...the BBS-3 for deeper diamond drilling

Here is the newly developed BBS-3 surface Diamond Drill. Like the well-known BBS-2SR and BBS-4 models the new BBS-3 is designed for speed, strength and ease of operation even under the most severe conditions.

Powered by a Perkins 95 h.p. R6 diesel or an optional 95 h.p. Hercules DJXH diesel, the BBS-3 has a neutral plus four forward and four reverse gears for either the hoist or the swivelhead. Other features include a strong high-speed hoist with speeds to 850′ per minute, choice of gear or hydraulic swivelheads, fast self-centering hydraulic chucks for soft formation drilling.



capacities

A rods.....1,600 ft.
B rods.....3,300 ft.
N rods.....2,500 ft.
H rods.....2,300 ft.
6" Rotary.....1,500 ft.

BOYLES BROS
DRILLING COMPANY LTD.
VANCOUVER, CANADA

BOYLES BROS. (PTY) LTD., JOHANNESBURG, SOUTH AFRICA • BOYLES BROS. DRILLING CO. LTD., NEWCASTLE-ON-TYNE, ENGLAND • ATLANTIC, GULF AND PACIFIC CO. OF MANILA, PHILIPPINES • SHRIRO TRADING CO. S.A. TOKYO, JAPAN • FORMAC S.A. RIO DE JANEIRO, BRAZIL • WEISE AND CA. LDA., LISBON, PORTUGAL • I. H. HANNA, 331 SANTA CRUZ, SAN ISIDRO, LIMA, PERU • R. I. E. G. A. BUENOS AIRES, ARGENTINA • HAEHRE AND CO. A/S. OSLO, NORWAY • INTERNATIONAL MACHINERY CO., SANTIAGO, CHILE DIMITRY SCALISTIRI, ATHENS, GREECE • THOMAS M. NEVIN, Y. CIA. S.A. MEXICO, D.F.

See the Willison Coupler at Booth 417, Metal Show, Los Angeles, Oct. 1-4

WILLISON

automatic

COUPLERS

for safety, speed, strength

If your operation involves haulage with locomotives and cars in the 1 to 30-ton range, it will pay you to investigate the advantages of Willison Automatic Couplers.

Willisons are *Safer*—because they couple automatically...*Faster*—because they're self-aligning...*Stronger*—because they take the full buff and pull forces without depending on intermediate parts.

Over 100,000 Willison Automatic Couplers are in daily use in mines, industrial plants and foreign railroad service because they're *safer...faster...stronger.* AA-5650

NATIONAL ALLOY STEEL CASTINGS COMPANY

Established 1868 — Cleveland 6, Ohio

WILLISON AUTOMATIC COUPLERS • RUBBER CUSHIONED UNITS
MINE AND INDUSTRIAL CAR TRUCKS • NACO STEEL WHEELS
NACO STEEL LINKS AND SWIVEL HITCHINGS

SELECTIVE MINING A PROBLEM?

This Marion 111-M dragline, equipped with a 4½ yard bucket, makes a good "prospector" in mining where irregular deposits require selective digging. With the 111-M, you get the "no-clutch-heat" advantages of electric swing, whether the machine has diesel or Ward-Leonard electric equipment. Its fast cycle time, travel speed, and long, wide crawlers help it to turn in a big day's work, every day.

MARION POWER SHOVEL COMPANY • MARION, OHIO

Serving Both Hemispheres

of the Mining World

CYANAMID

REAGENT NEWS

"ore-dressing ideas you can use"

Moisture Content of Zinc Concentrates Cut 1/3 with AEROSOL® OT *Surface-Active Agent*

Use of only 0.07 lb. AEROSOL OT Surface-Active Agent per dry ton of zinc concentrates at The Bunker Hill Company lead-zinc operation has resulted in tremendous improvement in filtration of slimy zinc concentrates. Characteristics of filter cake have been much improved, too. Since installation of regrinding circuits these concentrates run roughly 80% minus 325 mesh. Before use of AEROSOL OT, high moisture content caused endless trouble making concentrates stick in bins and on conveyor belts.

The concentrates are thickened, filtered and transferred to storage bins by conveyor. Formerly, two men were on almost constant duty helping to move concentrates from storage bins to railroad cars, and when loaded in cars, concentrates were lost through small holes as water was squeezed out. After testing many products the management found that AEROSOL OT Surface-Active Agent appeared to solve the problem. Its use cut moisture content of the filter cake by approximately 1/3, leaving the cake crumbly and non-sticking.

Here are the before and after facts:

	With 0.07 lb./ton AEROSOL OT	Without AEROSOL OT
Moisture in filter cake	8-10%	12-16%
Cake quality	Crumbly, non-sticking	Slimy, stuck to conveyor belt and to bin walls
Cake discharge from filter	Breaks free	Poor

AEROSOL OT solution is fed to the thickener discharge, with the filtrate going to the thickener well and the thickener overflow going to waste. An additional effect of AEROSOL OT addition has been to break up froth on the zinc concentrate thickener. No more foamy concentrates float on the surface.

AEROSOL OT Surface-Active Agent is available in a solid 100% grade and as a 75% aqueous solution. Other AEROSOL Surface-Active Agents are also available. Literature and samples for testing will be sent on request.

AMERICAN CYANAMID COMPANY

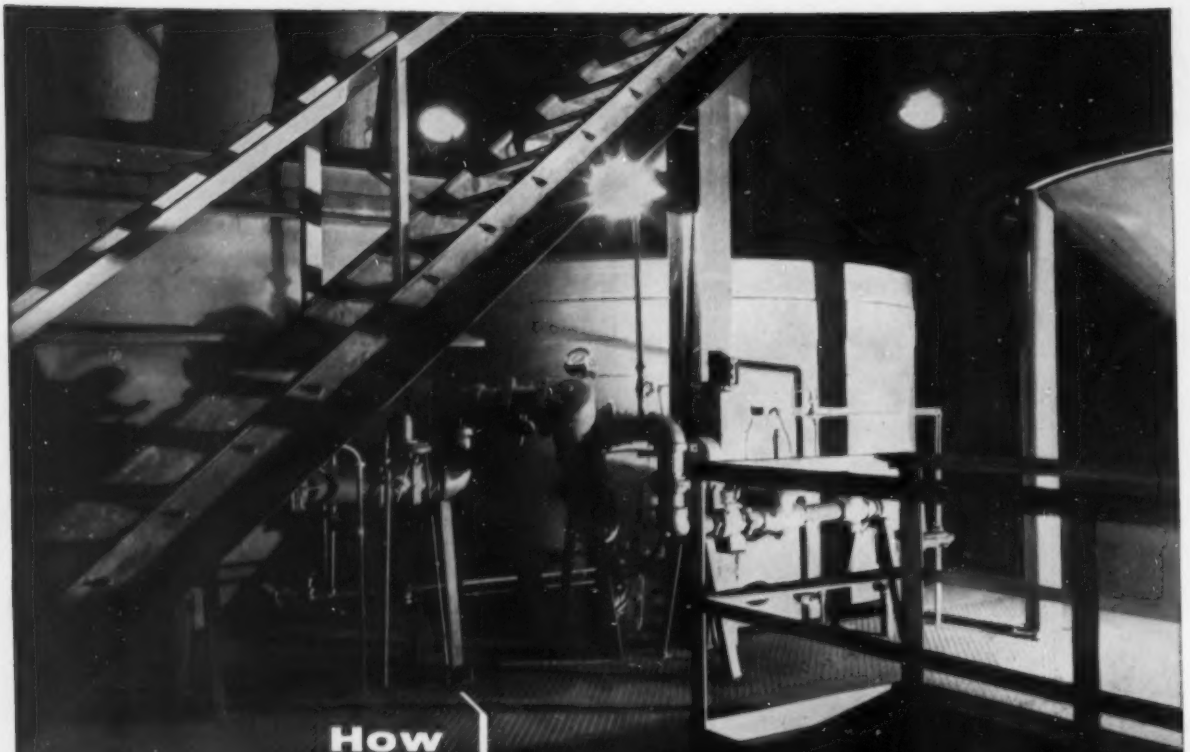
MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
Cable Address – Limenitro, New York

NORTH AMERICAN CYANAMID LIMITED
160 Bloor Street East, Toronto 1, Ontario, Canada
CYANAMID DE MEXICO, S. A.
Apartado No. 26012, Mexico 12, D. F., Mexico

CYANAMID PRODUCTS, LTD., Bush House,
Aldwych, London W. C. 2, England
SOUTH AFRICAN CYANAMID (PTY.) LTD.,
P. O. Box 7552, Johannesburg, Union of South Africa

E. P. CADWELL, Baion 1043,
Of. 6, Lima, Peru
G. B. O'MALLEY, MALCOLM GLEN,
377 Little Collins St., Melbourne C. 1, Australia



How Anaconda gets High Roasting Efficiency with a FluoSolids* System

For sponge iron production at Anaconda, Montana, Anaconda Company needed a calcine containing less than 1% sulfur. Their conventional fixed bed pyrite roasters, producing gas for an acid plant, delivered a calcine averaging 2 to 6% sulfur. The problem was solved by installing a Dorrco FluoSolids System for an additional roasting stage.

Unique in this installation is the fact that roasting is carried out autogenously on pyrite containing as little as 2% sulfur. Only outside fuel required is for starting up the System. What's more, with sulfur in the feed all the way from 1 to 9%, calcine from the FluoSolids System consistently contains 0.8 to 0.9% S. The FluoSolids Reactor has an inside diameter of 10′ and handles 200 TPD at 1200°F.

High roasting efficiency is just one of the many advantages of fluidization. If you'd like more information on the Dorrco FluoSolids System, the most significant advance in roasting techniques in the last 30 years, just drop a line to Dorr-Oliver Incorporated, Stamford, Connecticut.

*Trade-Mark Reg. U. S. Pat. Off.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

HOW A NEW IDEA AND A NEW **D8**
CUT MATERIALS-HANDLING COSTS

This new CAT* D8 Tractor is hard at work in one of the sulphur vats in the Texas-Louisiana Gulf Coast Area. Note the special sideboards and extended blade on the No. 8U Bulldozer, which also has back-rip teeth. This rig breaks down vats of sulphur and handles in excess of 400 tons per hour of the light material.

The new D8 handles sulphur more quickly and inexpensively than was possible with the old method of blasting. In addition to saving several hundred cases per month of blasting material and eliminating other expensive related operations, the new Caterpillar D8 Tractor with 'dozer breaks up sulphur lumps and does away with hand picking.

Why was Caterpillar selected? First, because of the close co-operation of the local Caterpillar Dealer in developing this special sulphur-handling 'dozer. Second, because of the excellent performance of other equipment built by Caterpillar, which is used almost exclusively by this producer.

The new Caterpillar D8 Tractor is designed to outwork and outlast any previous crawler. Its new 4-cycle Caterpillar Diesel Engine develops 191 HP. New seven-roller track frame and "water-quench" hardened track shoes give even longer work life. Hydraulically boosted steering, "in-seat" starting and superb visibility give the operator greater efficiency and convenience. The D8 is available with torque converter (Series D) or exclusive oil clutch (Series E) to suit *your* job.

See your Caterpillar Dealer for full details. And count on him for dependable parts and service.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Big output without costly breakdowns—even in rock! That's typical of Limas like this rugged Type 2400 stripping overburden near Mt. Claire, W. Va.

Rock and Shale won't stop this rugged LIMA 2400

Rock and shale won't stop this rugged Lima Type 2400 5½ yd. shovel. It strips down to coal level fast . . . through any type of overburden. Lima quality gives it the tough construction, extra weight and smooth power to handle the toughest stripping jobs, at top speed, day-in and day-out.

You can't beat the Type 2400 for big output; fast, easy, economical operation; minimum repair and maintenance . . . no matter how hard the digging. Get the full story today from your nearby Lima distributor, or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Piston-type dirt seal rings and retainers in crawler rollers.
2. Moving parts are flame or induction hardened for longer life.
3. Two-shoe swing and propel clutches; air control.
4. Anti-friction bearings at all important bearing points.
5. Big capacity drums and sheaves are easy on cables.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Torque converter (standard equipment).
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (½ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

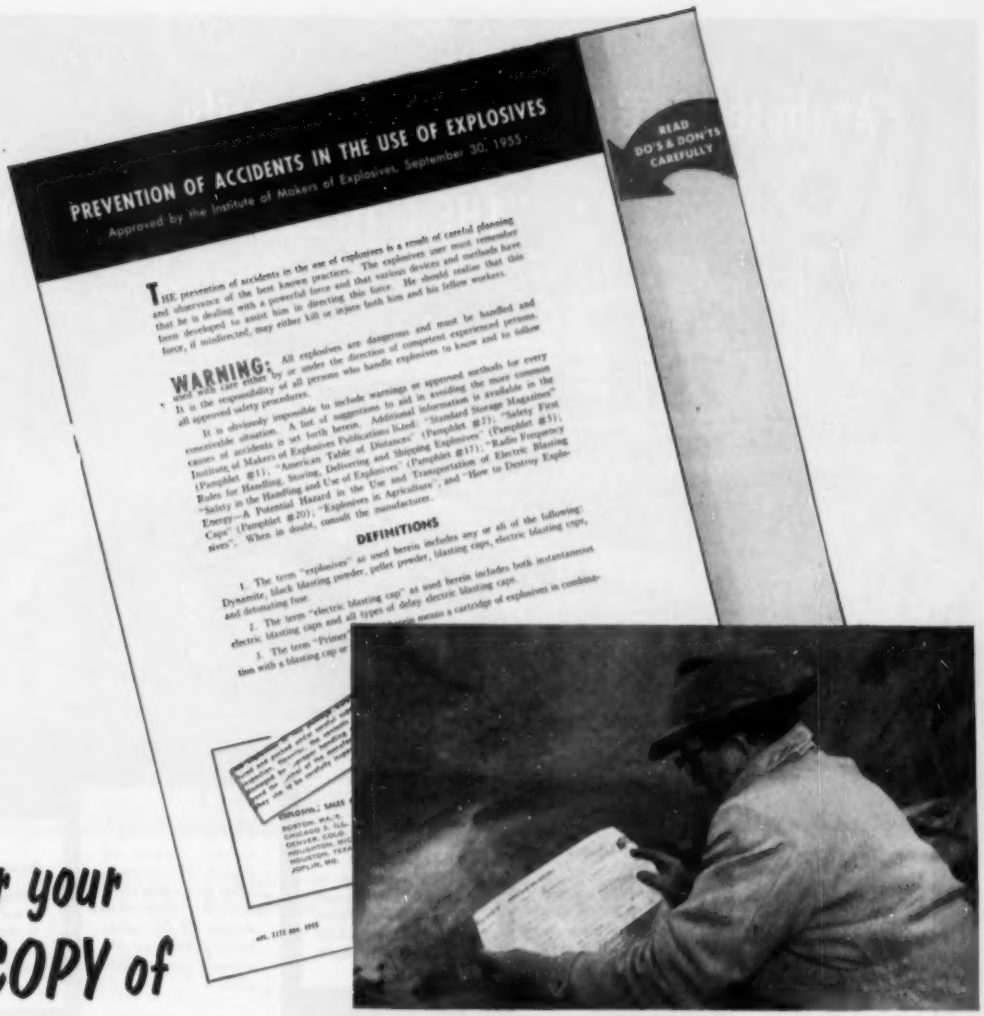
LIMA SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division—LIMA WORKS

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation • Hamilton • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

Cable Address: LIMASHOVEL, Lima, Ohio, U. S. A.



Send for your FREE COPY of

do's and don'ts with explosives!

Everyone who has anything to do with explosives should have a copy of this new, revised, up-to-date list of *instructions and warnings*, approved by the Institute of Explosives Makers.

It covers important functions in the handling and use of explosives—*lists 72 Do's and Don'ts* for prevention of accidents in handling, transporting, storing, loading, tamping, shooting and disposal.

Contains vital precautions when shooting either electrically or with cap and fuse . . . eleven suggestions for minimizing poison gas hazards . . . prevention of misfires . . . approved methods for priming. Send for your *free copy today!*

EXPLOSIVES DIVISION
ATLAS POWDER COMPANY
WILMINGTON 99, DELAWARE
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Explosives Division
ATLAS POWDER COMPANY
Wilmington 99, Delaware

Please send me a copy of the new "DO'S and DON'TS with Explosives."

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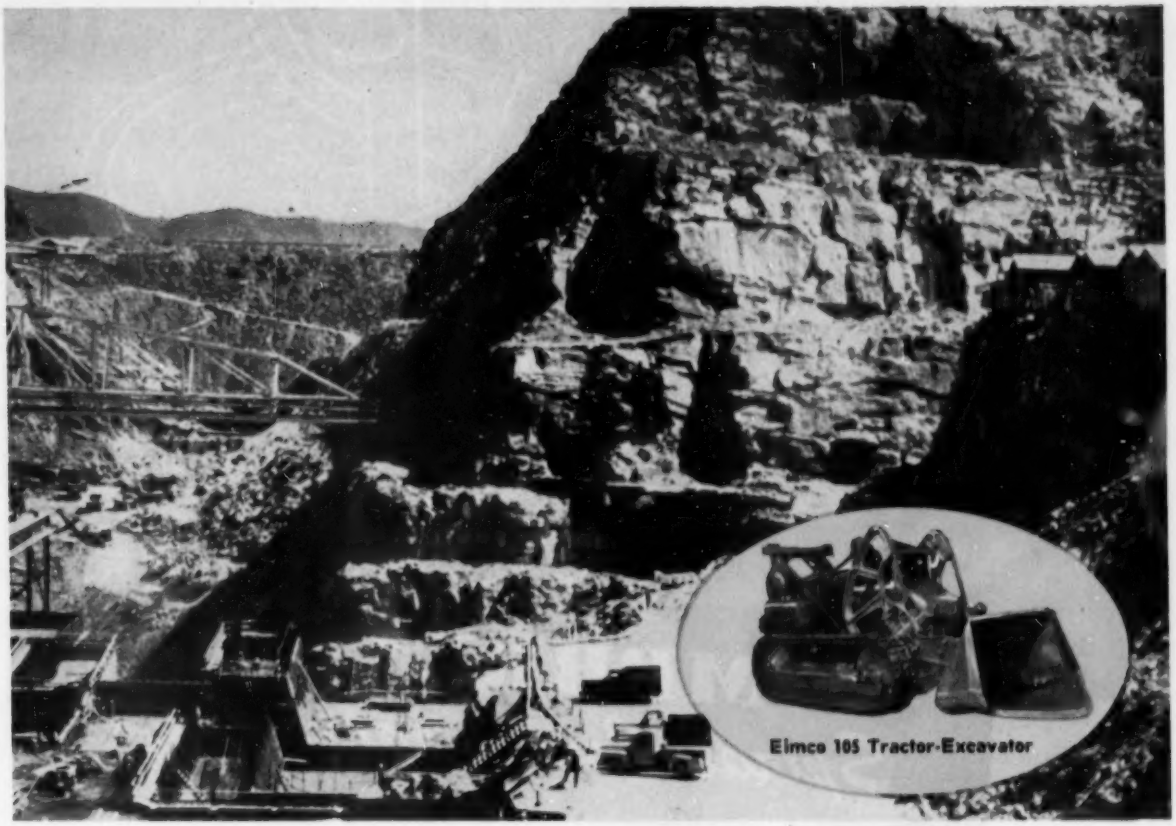


INDIA – EIMCO 105's KEEP GRUELLING SCHEDULE

Two Eimco 105 Tractor-Excavators have each worked 8,000 hours in 12 months to keep progress on schedule at a huge dam project in India.

The machines have received intelligent maintenance and repairs have been small.

Eimco 105 Tractor-Dozer

At work on diversion, penstock and highway tunnels, trained Indian crews operating the 105's are doing an excellent job of tunnel driving. In some instances, advance for the size of tunnel being excavated may establish new world records.

"Eimco 105's are preferred equipment to use for tunnels of this type," says one official of a contracting firm. "The transmission, clutches and drive on both machines have not been touched in 8,000 hours of operation. They are in good condition and we expect them to last many more years."

Have you considered why the Eimco 105 is "preferred equipment" to contractors of huge dam, tunnel and road projects in the export market?

It's becauuse their dependability is reflected through their engineered strength to stay on the job around the clock – day in and day out.

The Eimco 105's dependability eliminates the necessity of a sizeable parts depot. Eimco's are built to 100,000 hour standards for service in remote areas. Time saved by Eimco's working continuously with no down time for repairs is a big factor in selecting equipment.

Conditions being equal, Eimco 105's will produce more at less cost and in less time than comparative equipment. Let Eimco show you how this versatile unit can outperform and out-work heavier, more expensive units.

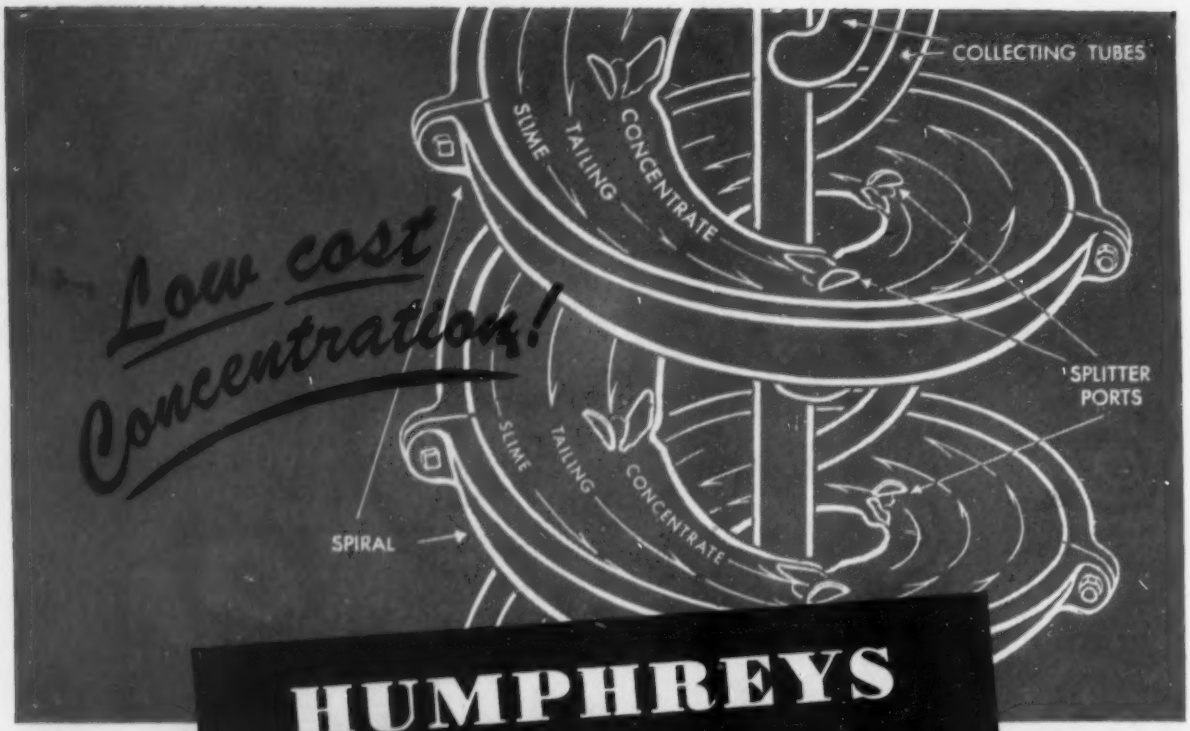
See the Eimco 105 before you buy any crawler tractor equipment.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Cleveland, Ohio Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

B-214



Low cost Concentration!

HUMPHREYS
Spiral Concentrator

LOW COST CONCENTRATION

Humphreys spiral concentrators have successfully treated

Hematite	Muscovite
Martite	Biotite
Magnetite	Lepidolite
Ilmenite	Vermiculite
Zircon	Native Copper
Rutile	Chromite
Monazite Sands	Pyrite
Phosphate Rock	Barite
Tungsten	Tantalite
Wolframite	Columbite
Scheelite	Talc
Micas	Anthracite Coal

Throughout the world economy-minded mineral producers rely on Humphreys Spirals . . for low-cost concentration and increased production. These highly efficient concentrators are noted for economical installation, low-cost maintenance and dollar-saving operation . . . plus trouble-free performance over long periods of operation. No moving parts. Require very little floor space.

APPLICATIONS:

- Production of a concentrate and a tailing in a single rougher stage.
- Production of a bulk concentrate of several heavy minerals and a finished tailing.
- Scavenging the tailing from another process for the recovery of heavy minerals not amenable to the primary processes.
- Production of a finished concentrate, with a tailing to be treated by another process.

Write today for information on metallurgical tests of your ore samples for spiral treatment.

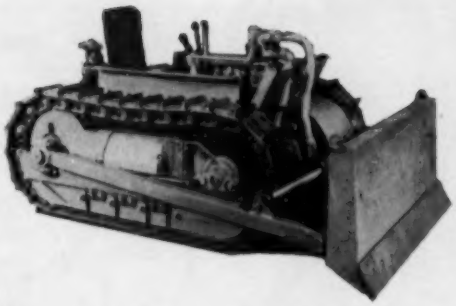
Engineering Division

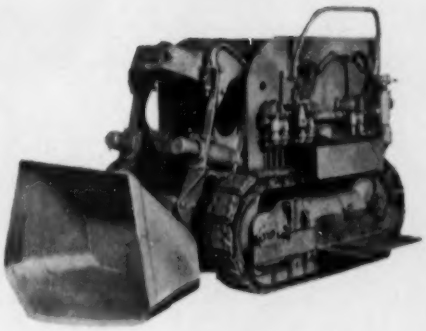
THE HUMPHREYS INVESTMENT CO.

905 FIRST NATIONAL BANK BUILDING • DENVER 2, COLORADO

Sales and Manufacturing Agents—AUSTRALIA: John Carruthers & Co. Pty. Ltd. Edgecliff, N.S.W.—SOUTH AFRICA: Edward L. Bateman Ltd., Johannesburg — SWEDEN: Sala Maskinfabriks A-B, Sala.
Sales Agent—ENGLAND: Fraser & Chalmers Engineering Works, Erith, Kent.

NOW! IN CRAWLER TYPE MACHINES FOR TRACKLESS WORK, THE SAME HEAVY RUGGED CONSTRUCTION AND DEPENDABILITY THAT THE INDUSTRY HAS HAD IN EIMCO WHEEL TYPE MACHINES.





Fast, sharp maneuvers, regulated by fingertip control make the EIMCO 630 EXCAVATOR a production giant and an operator's delight.

With the power at his fingertips to move one track into forward motion while the other is in reverse motion, an operator can make the 630 veritably "walk" around a muck pile—working from any angle without backing to make a new approach.

Eimco 630 agility permits operators to quickly master movement of the machine to a point that lost motion is eliminated between excavating and discharge stages.

While the 630 is moving between points of excavation and dumping, the bucket progressively elevates in an arc. Through proper timing, arrival of the 630 and bucket discharge become simultaneous operations. And the large half-yard bucket provides greater tonnage at every discharge.

These three pluses—extra maneuverability, operational ease and larger bucket capacity added in terms of economic value to you mean **MORE TONNAGE IN LESS TIME.**

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Pasadena, Calif. Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

B-215

RUGGED BUTYL INSULATION plus neoprene jacketing gives this ANACONDA Mine Power Cable long life under rugged conditions: 60-ft. drop over rocky cliff, unprotected from sun or weather in northern open-pit mine.

BUTYL INSULATION MEANS LONGER LIFE

This Cable is as tough as the terrain looks!

Experience shows that in high-voltage mine power cable, the insulation must provide not only good ozone resistance but *mechanical strength* as well.

The unusual tensile strength and inherent ozone resistance of Anaconda's butyl insulation means the strongest, sturdiest mine power cable ever offered you.

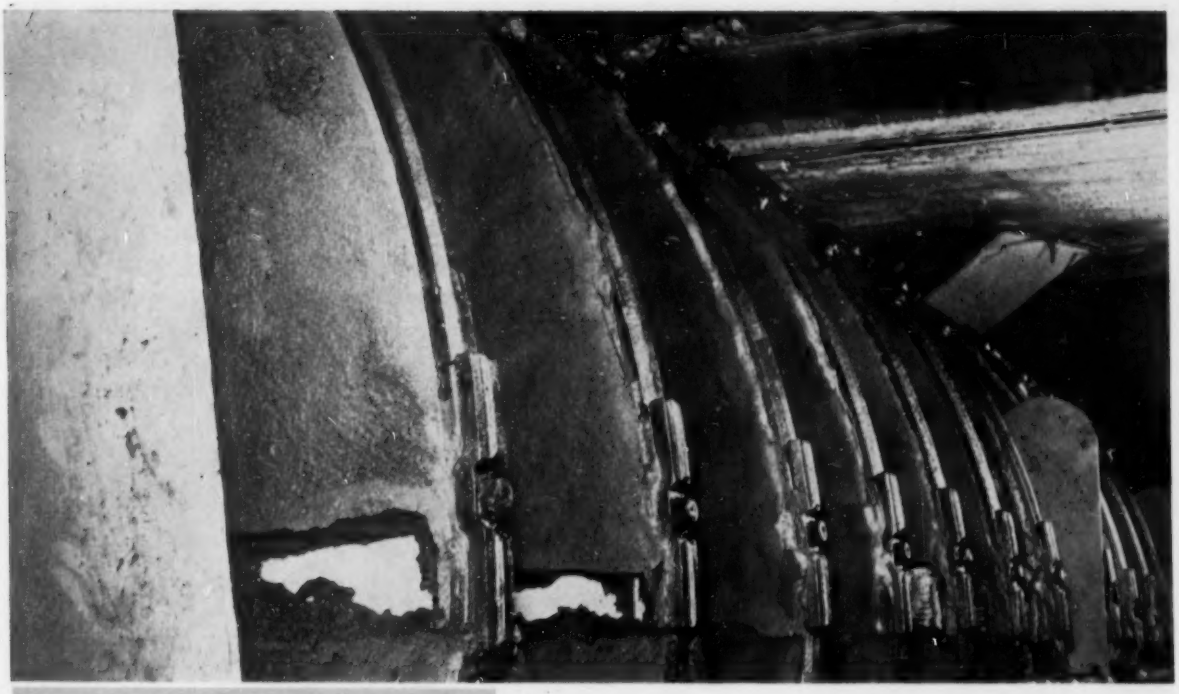
In addition, this insulation resists heat, moisture and has high dielectric strength. Over the insulation is a tough, abrasion-resistant neoprene jacket—engineered from years of testing in our own mines.

NEW ENGINEERING BULLETIN EB-27 has full details on performance of Anaconda butyl insulation in 15 Industry Specification tests. Ask the Man from Anaconda for your copy as well as more information about ANACONDA Mine Power Cable. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

56331

SEE YOUR ANACONDA®

DISTRIBUTOR FOR MINE POWER CABLE



Function of "impeller" design is agitation thru stirring. Results: Cake scour and uneven formation; vacuum loss at thin sections near the periphery of disc. (Other methods included pipes for air and steam bubbling.)

This "rake oscillating agitation" design (from drum filters) is equipped with upright pieces of various shapes to increase agitation. The result: Cake scour and uneven formations due to direction of thrust.

The Eimco Agidisc method now used provides agitation straight-up between the discs, giving the many advantages listed in text at right.

EIMCO AGIDISC FILTERS HAVE EXCLUSIVE ADVANTAGES

Eimco Hy-Flow Agidisc Filters give you these important advantages:

1) Even cake distribution without segregation. **2)** Uniform thickness and dryness. **3)** Higher tonnage capacity per square foot of filter area. **4)** Dryer cake. **5)** Clean discharge. **6)** Longer media life. **7)** Lower maintenance costs.

After Eimco pioneered the agidisc filter, other manufacturers tried to match its performance by adding attachments to their existing filters.

Sketches at left readily show disadvantages of makeshift agitation.

The Eimco Agidisc is NOT a "patched up" version of other filter designs with doubtful operating merits. It is an integral unit. Scientific planning went into its distinctive design. Advantages were test-proven before it was marketed.

Confirmation that these filters are producing the advantages for which they were designed, is being received every day from Eimco Agidisc users.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Cleveland, Ohio Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

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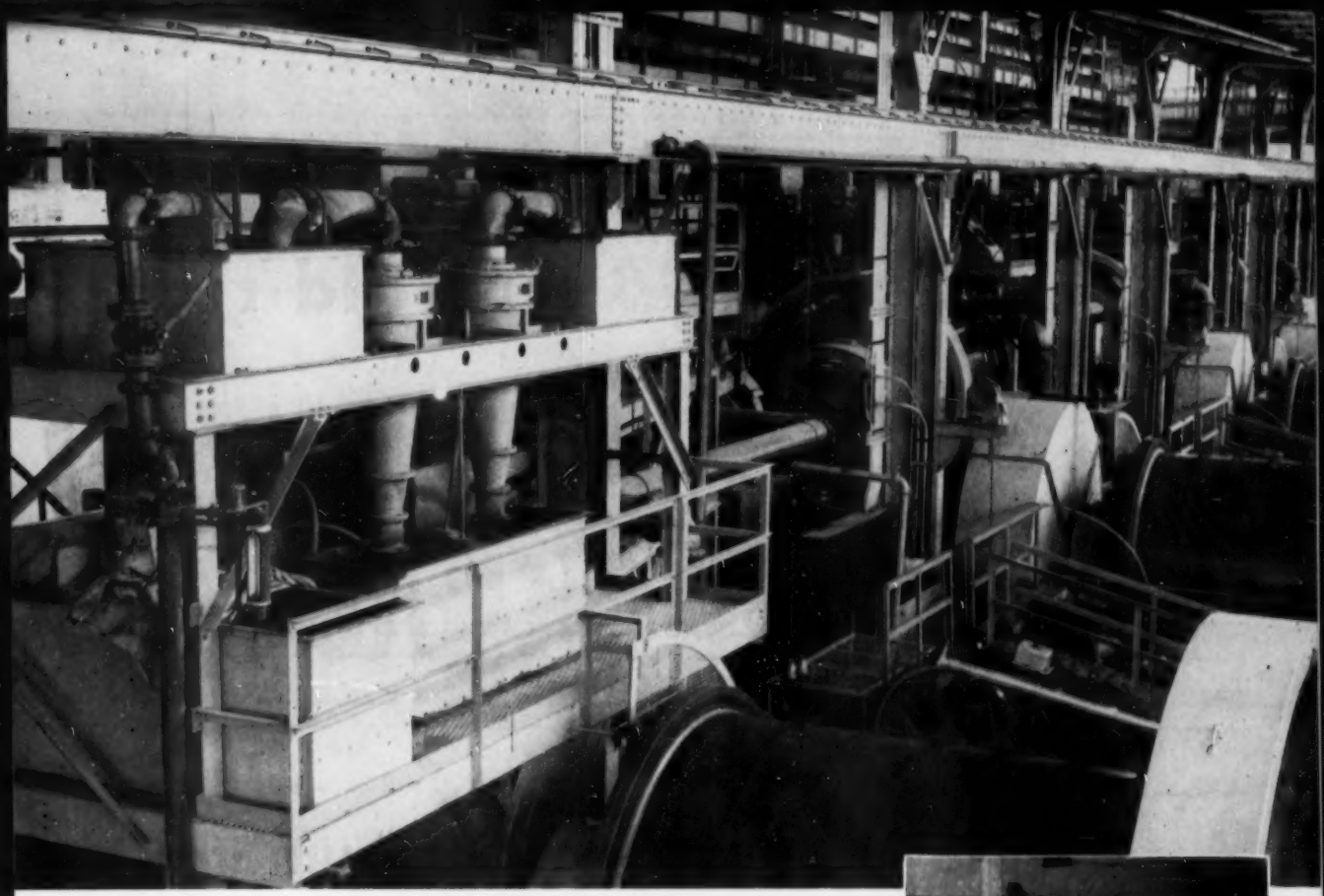


Two model D20 Krebs Cyclones in closed circuit with a 9′ x 11′ ball mill

Krebs Cyclones in closed circuit and for sand-slime separation

Two model D20B Krebs Cyclones on the sand-slime separation

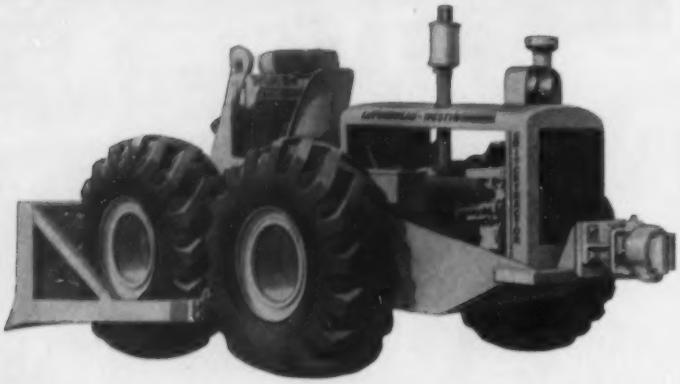
Homestake Mining Company uses Krebs Cyclones for closed circuit classification with their new grinding unit and for the sand-slime separation. The cyclones, specially designed for each objective, are low in cost and easy to operate. The new classification techniques give sharper cuts and better percolation rates. Hundreds of model D20, D20B and EE20-9B cyclones are in service and all are operating with the original molded replaceable body liners and long sweep inlet nozzles. Many of these have now handled over a million tons of ore per cyclone.

EE PRODUCTS

EQUIPMENT ENGINEERS INC.

41 SUTTER STREET SAN FRANCISCO 4, CALIFORNIA

Manufacturers of Krebs Cyclones, Valves and Clarkson Feeders



new switch for old rig!

SwitchTractor

Now . . . time-tested Tournatractor

When not needed for spotting or hauling rail-cars, fast-moving, double-duty SwitchTractor drives anywhere around pit or plant on dozing, maintenance, and clean-up chores.

Ten years' hard use has improved and perfected the fast, rubber-tired performance of this work-and-run Tournatractor. Thousands of these machines have proved their value in dozing, hauling, pushing, grading, scarifying, compacting, and snowplowing in practically every country of the world. Each year has seen many major improvements. Wherever speed and maneuverability are needed, these fast-moving rigs have given outstanding service.

Doubles value of Tournatractor

Now — with new *SwitchTractor* application — this versatile unit gives you added utility. Equipped with a standard railway coupler at the rear, SwitchTractor does double-duty on your location . . . switches freight cars on your siding, yard, or pit at a moment's notice. Rig has plenty of power and traction to pull and spot long trains of cars as needed, saving time and money.

SwitchTractor often eliminates the need for maintaining private switch engines and engineers . . . saves charges and delays for RR switch service. Your single SwitchTractor and operator may well handle all your scattered tractor-dozer work — plus whatever freight-

New double-duty SwitchTractor
Famous high-speed work-and-run tractor now available with standard railroad coupling attachment. Makes rig even more versatile . . . gives you the plus value of a go-anywhere off-track switcher for hauling and spotting cars on your sidings, yard, or pit.

also spots and switches freight cars

car switching is required! Highly maneuverable in close quarters, unit turns around in its own length.

Off-track travel cuts switching time

SwitchTractor gives you several important advantages. Rolling on big, low-pressure rubber tires, this go-anywhere rig always takes the shortest route to every switching or hauling assignment. No matter where it happens to be working, unit easily highballs across yards, fields, tracks, ties, ditches, embankments to its next assignment — without damage to machine or roadbed. In hauling cars, it straddles tracks . . . does not chamfer ties or damage switches.

Depending on the distance and number of cars to be spotted or hauled, SwitchTractor can either push (with its dozer or push-plate), or pull with its drawbar. Coupling to cars with drawbar at rear takes but a moment. Coupler is safe, sturdy, standard RR type.

60% vs 30% coefficient of friction

Rolling on big rubber tires over ballast and ties, instead of with steel wheels on steel rails, SwitchTractor develops much more coefficient of friction (60% compared to 30%) than track locomotives of *twice* its weight. That means you have plenty of tractive power for fast starts and stiff rail grades in hauling cars. When not needed for handling cars on your pit or yard tracks, SwitchTractor keeps working productively for you as a dozer or towing tractor.

Worthwhile savings with SwitchTractor

If you have freight cars to move on your siding, yard, or pit, the added versatility of this new SwitchTractor will really pay off for you. Get all the facts on how this coupling-equipped go-anywhere tractor can save thousands of dollars for you in equipment investments and manpower economies. Write us for details on how this machine can handle *your* type of work.

LeTourneau-WESTINGHOUSE Company
Peoria, Illinois
A Subsidiary of Westinghouse Air Brake Company

Why a yielding arch is superior to rigid roof support

In moving ground, even the strongest types of rigid supports cannot withstand the dynamic pressures caused by the weight and subsidence of overburden.

But an arch that will yield, such as the Bethlehem Yieldable Arch, allows the overburden to settle slowly, forming its own natural arch which in turn carries the major portion of the load. As the Bethlehem Arch yields, the stress is absorbed by the rock itself until equilibrium is reached.

Thus it is not the strength alone but the "give" of the Yieldable Arch that holds a tunnel or drift open. This yieldable feature comes from nesting the segments of an arch set one into the other so that they overlap. The U-bolt clamps that hold the overlapping segments together are drawn tight enough to create the right amount of friction. When the load becomes excessive it overcomes the friction sufficiently to make the segments slide, equalizing the pressure.

Each arch set is tied to its neighbor by horizontal steel struts attached with J-bolts to maintain proper spacing and lateral stability. A Bethlehem Pacific engineer will be glad to consult with you on the application of Yieldable Arches to your mine.

SEE IT AT LOS ANGELES

OCTOBER 1, 2, 3, 4

AT THE EXPOSITION OF THE AMERICAN MINING CONGRESS

The Bethlehem Yieldable Arch will be demonstrated at Bethlehem Pacific's Booth No. 318 in Area A.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

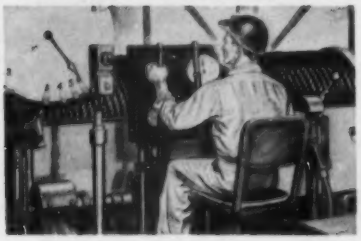
Sales Offices: Los Angeles, Phoenix, San Francisco, Portland, Seattle, Spokane

BETHLEHEM PACIFIC

BETHLEHEM STEEL

M.S.A. MINEPHONE

Messages are dispatched instantly to all motormen, who can receive and reply while trips are in motion. System keeps main line haulage-ways free of traffic tie-ups; reduces errors and accidents; prevents excessive stop-and-start strain on equipment.



M.S.A. HOISTPHONE

Continuous, clear voice communication between hoisting engineer and cage, at any level, and while cage is in motion. Ideal for safer load leveling, inspection trips, shaft repairs. Utilizes existing wiring. ALSO —M.S.A. PORTABLE HOISTPHONE—compact unit can be set up anywhere, put into immediate service. Permits temporary communication for inspection work, emergency jobs.

EDISON R-4 ELECTRIC CAP LAMP— M.S.A. TYPE K SKULLGARD

More and better illumination for today's modern mining methods. The R-4 Lamp's brilliant, unfailing illumination lets miners work faster, better, safer. The famous Type K Skullgard, is strong, light, durable. Maximum head protection that is not affected by oil, water, perspiration.

These M. S. A. products can help answer
YOUR PRODUCTION-SAFETY NEEDS

M.S.A. SELF-RESCUER

For immediate breathing protection in emergencies. Vital to the miner while traveling through carbon monoxide to fresh air. Available in cache assemblies for storage throughout the mine, or in individual carrying cases. U.S. Bureau of Mines Approved.

M.S.A. CHEMOX

Provides complete breathing protection in any atmosphere. Chemox generates its own oxygen from replaceable chemical canister. Weighs only 13½ lbs. Comfortable in service. U.S. Bureau of Mines Approved.

M.S.A. DEMAND WORK MASK

Breathing protection for planned work in toxic atmospheres. Mask provides self-contained air or oxygen supply. Connecting hoses lets wearer move freely. Manifold arrangement permits use of more than one unit from a single cylinder.

M.S.A. DUSTFOE RESPIRATOR

Maximum protection against dusts. This unit is compact, very light in weight. Its design eliminates "blind-spots," provides wearing comfort that encourages full-time use. U.S. Bureau of Mines Approved.

M.S.A. CHEMKLOS

Made throughout of Dynel, the new fabric that resists acids and caustics, M.S.A. ChemKlos answer the need for longer-wearing, smarter-looking work clothes. Special weave for maximum resistance to abrasion. Also, miner's rubber suits, boots, etc.

M.S.A.-LAMB AIR MOVER

Practical, portable ventilating device that uses only compressed air or steam. No motors, turbines, fans. Three sizes—largest size moves as much as 5,160 cu. ft. air per min. Forces air in, or sucks fumes out.

M.S.A. RAIL PUNCH

Makes quick, safe work of punching holes through web sections without need of external power.

M.S.A. PNEOLATOR

Portable, self-contained automatic artificial respiration device. Unit is protected by rugged carrying case.

also—a complete line of portable instruments for detecting CO, H_2S, SO_2, HCN. Instruments for collecting, sampling, counting dusts. First aid kits and materials.

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New Stoper Drill Design Combines 30% Reduction in Weight with 10% Faster Drilling Speed

Use of modern materials in new Le Roi-Cleveland S-10 Stoper results in easier handling.

With the introduction of the new Le Roi-Cleveland S-10 Stoper, great strides have been made in easing the work-load of miners. At the same time, their productivity, in terms of footage drilled per shift, has been increased.

New stoper uses aluminum feed leg to help decrease weight as much as 30% and provide better balance. This type of feed leg, already so successful on Le Roi-Cleveland Air Legs, contributes greatly to weight reduction: The S-10 with 18-inch steel change weighs only 79 lbs!

10% faster drilling speed results from a combination of design features: The new valve is timed and ports are arranged so that a maximum flow of air is delivered to the piston on both downstroke and upstroke. Hard-hitting, rock-shattering blows result, along with a rotation that's strong enough to turn the steel in the worst kind of drilling.

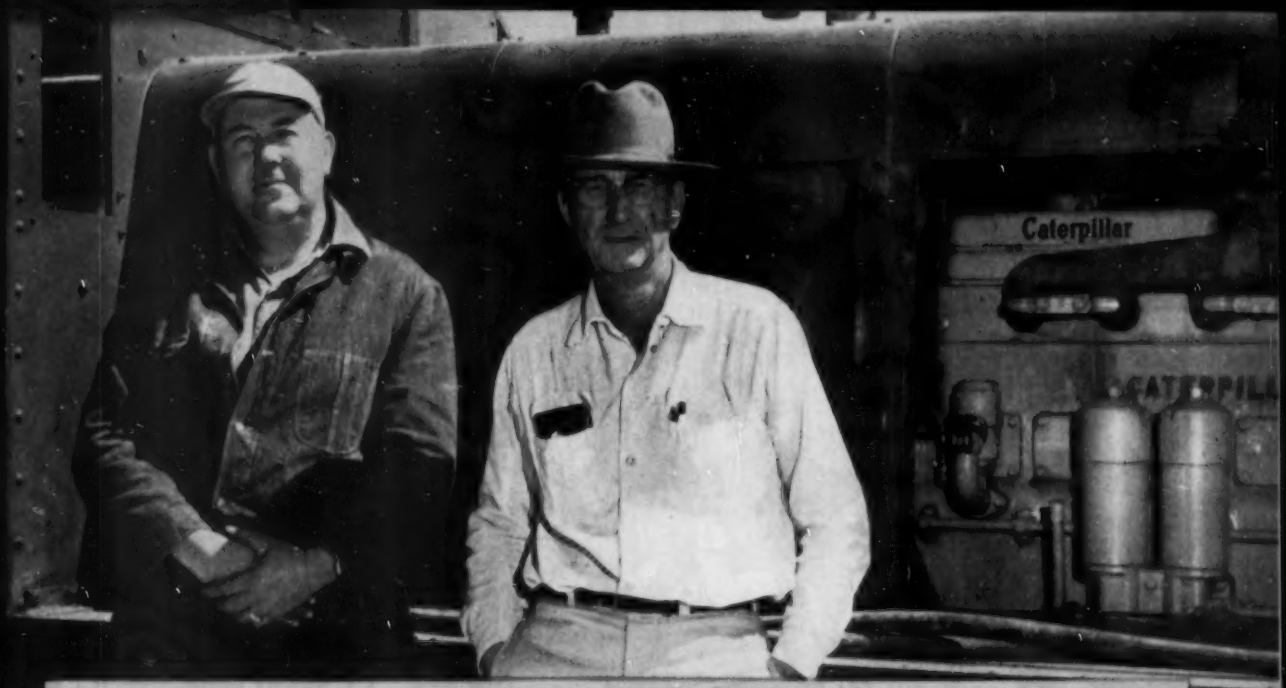
The variable feed-pressure control also adds greatly to the performance of the S-10. It has a wide enough range to feed the machine properly against all kinds of rock. Maximum drilling speed is attained. At the same time, both bit life and machine life are increased.

Exclusive steel puller permits the use of collared steel. This is of special advantage in tight ground, where stuck steels used to be a problem. The new steel puller, consisting of only 5 parts, also makes stoper operation safer. Since the steel never leaves the machine, the danger of falling drill steel is eliminated. The new S-10 Stoper is also available with tappet-type construction for shankless steel.

Three sizes of feeds are available. The S-10 can be supplied with 18, 24, and 30-inch steel changes for ⅞ and 1-inch hexagon or quarter-octagon steels, with or without collared shanks.

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

RD-43



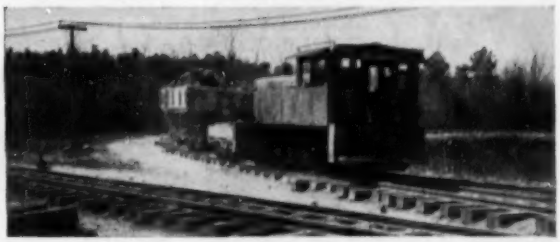
George Atchison (left), engineer, and J. G. McVay, superintendent, with Caterpillar-powered Vulcan locomotive owned by Lone Star Cement Co. of Jackson, Ala.

TORQUE CONVERTER SMOOTHNESS + DIESEL FUEL ECONOMY = BIG SAVINGS FOR LONE STAR

Lone Star Cement Co. of Jackson, Ala., installed Caterpillar D318 Torque Converter Power Units in two 12-ton Vulcan locomotives, replacing gasoline engines with conventional transmissions. Let J. G. McVay, superintendent, tell the story: "With these CAT* Diesels, we've gotten away from a lot of costly transmission repairs and maintenance. And we used to burn 22 gallons of gasoline in an eight-hour shift. Now we use only 10 gallons of fuel oil per eight hours—a big saving to us."

The two locomotives make 40 to 45 round trips per day over the two-mile track from pit to loading conveyor. They haul six cars, each loaded with seven tons of limestone and clay, up a two per cent grade. A Caterpillar Engine with torque converter is ideal here. Engine power is smooth and oil-cushioned, moves off with big loads quickly, and climbs grades without shifting.

The Caterpillar D318 is a 137 HP (maximum output capacity) diesel that operates on money-saving, non-premium furnace oil. Thanks to its four-cycle design, there are no cylinder ports or air boxes to clean. And its large-orifice, Caterpillar-built fuel injection system means that the engine will not foul, even when idling for extended periods. With such Caterpillar features as "Hi-Electro" hardened cylinder liners and crankshafts, aluminum-alloy bearings and highly effective oil, air and fuel filters, this rugged yellow engine is built to stay on the job and out of the shop.



There's a full line of Caterpillar Torque Converter Power Units up to 650 HP (maximum output capacity). Leading manufacturers can supply mining equipment with Caterpillar power. And your Caterpillar Dealer can install a Cat Diesel if it's time to repower. Discuss your engine needs with him soon—and count on him whenever you need skilled service or parts you can trust.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U.S.A.

CATERPILLAR*

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MODERN HEAVY-DUTY POWER

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Yes, CF&I's exhibition booth will be fully equipped as a hospitality center at the Mining Show in Los Angeles. There'll be everything you need to make your stay comfortable and successful. Whether you want ice water, a place to sit down and relax, telephone service, or even secretarial assistance, you'll be able to get it at CF&I's hospitality center—Booth 440.

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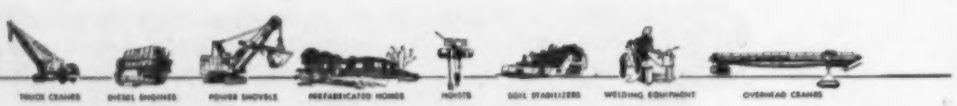
Which electric leads the

Magnetorque* and Electronic Controls

the **P&H** *line*



shovel Big Three?

put P&H WAY AHEAD!

How can P&H performance be so far ahead of all other electric shovels.

One reason is Magnetorque, the electro-magnetic transmission that gives smooth, stepless operation. Just look what you get. Simplest hoist control, by far. Simplest hoist machinery, by far. Instant response to control and load changes. Automatic cushioning of shock loads. Greater bail pull *in the bank!* Greater efficiency. Cuts maintenance and operating costs. Plus many other advantages. Exclusive with P&H.

Another reason. P&H Electronic Controls. They give you instant response to signal. Stepless control. 12% faster cycle. 16% savings in operating time. Less operator fatigue. Reliability. Simplicity, plus many other advantages, exclusive with P&H.

For complete information about these *exclusive P&H features,* and others, call your P&H representative. Harnischfeger Corporation, Milwaukee 46, Wisconsin.

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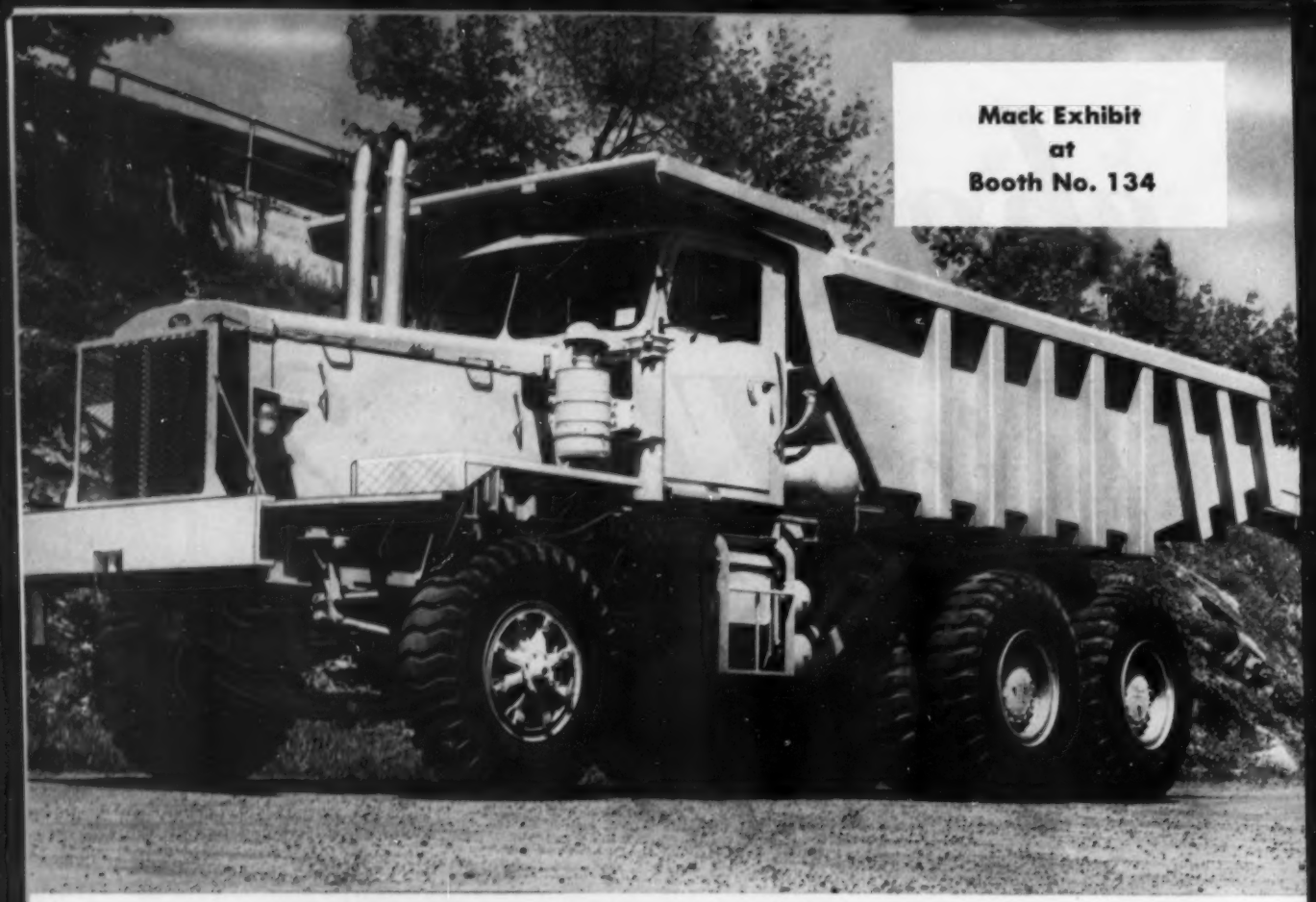
P&H ELECTRIC SHOVEL DIVISION



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. . . Mack's LRVSW, an off-highway dumper that combines mammoth size with brute strength . . . 34-ton capacity, 400 h.p. diesel engine, exclusive Balanced Planidrive bogie, four-speed overgear transmission coupled with a single-stage hydraulic torque converter, plus many more outstanding features . . . a dumper whose stamina and performance assure minimum haulage costs for your big jobs.

When you have inspected the super-capacity LRVSW, let us give you the facts on Mack's complete line of off-highway vehicles . . . the largest selection in the industry. You'll find a heavy hauler to suit every large earth-moving job . . . a hauler that will give you top performance, outstanding economy, maximum dependability — qualities that have made Mack the acknowledged heavy-duty truck leader of the industry.

Get the full details at the Mining Show in Los Angeles, October 1-4, or contact your local Mack representative. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

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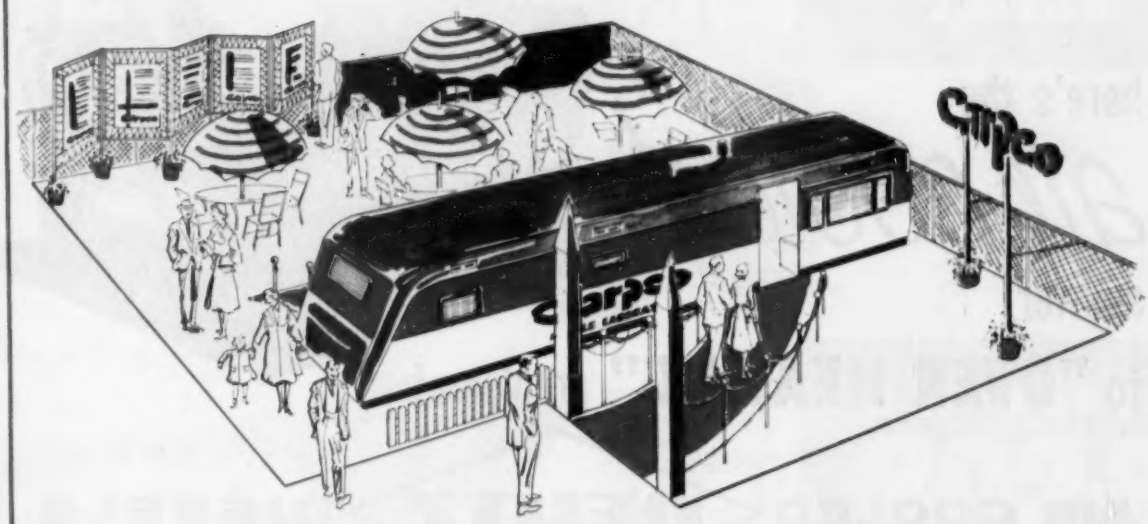

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It's traveling from coast to coast to see you at the Mining Show. Be sure to visit our mobile laboratory to see operating high tension and magnetic separators and gravity concentrators—operating continuously in conjunction with scale models of Carpco's materials handling equipment.

From the smallest detail to completely packaged plants . . . it's Carpco *all over the world!*

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CARPCO CONSTRUCTION CORPORATION • CARPCO EXPORT CORPORATION

JACKSONVILLE, FLORIDA, U. S. A.

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air cooled

answer

to **"OVER HEATING"** problems!

AIR COOLED DEUTZ DIESELS

DESIGNED FOR HOTTER, CLEANER RUNNING WORK CONTINUOUSLY IN 140° WEATHER ELIMINATING WATER

Engines for "stationary" use that never have cooling-heating problems — with higher fuel efficiency — and simpler design for maintenance ease and economy . . . the construction industry finds *all* these advantages in the Deutz Air Cooled Diesels.

Built in horsepower ratings from 5 to 250, and in 1, 2, 3, 4, 6, 8 and 12 cylinder models, Deutz Air Cooled Diesels start easier, and warm up faster. They are designed for higher operating temperatures than liquid-cooled units, and the higher temperature-compression levels mean greater fuel efficiency. The hotter combustion conditions likewise end corrosion danger from the sulphur content of most Diesel fuels — preventing the condensation of sulphurous acid within the cylinder.

Deutz engines are turning in impressive performance records in hoist, pump, generating, and such stationary uses; on tractors, shovels, and other mobile equipment, and in heavy duty trucks and buses.

Deutz Air Cooled Diesels are built in West Germany by the world's largest and oldest builders. They are available *now* in your area. For name of your nearest representative, or for more information on Deutz Diesels, please write or wire:

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DIESEL ENERGY CORPORATION

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Truck Equipment & Supply
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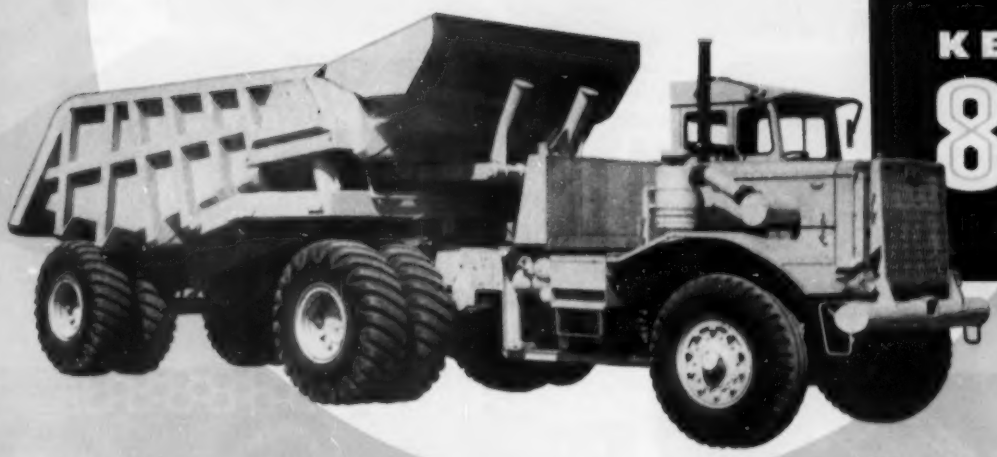
KENWORTH
802
24-TON



KENWORTH
802-B
48-TON

What do you need on your job? Kenworth has the custom-built end-dump for you—developed in cooperation with contractors and miners to haul rock and ore at lowest cost. Among the many Kenworth-engineered rock and ore movers are the 802 with its capacity of 19 cu. yds. heaped, and the 802-B with a trailer carrying a big 32 cu. yd. load. Both are built to haul tremendous loads over the roughest terrain where ordinary heavy-duty trucks wouldn't stand the going. Each has Kenworth's variable section frame, measuring 15½" at its deepest section. Front axle capacity is 25,000 lbs.—drive axle capacity, 70,000 lbs. Here are spring-mounted huskies easy to control, moving quickly and smoothly in and out of tight corners. Power steering installation is simple and rugged—brakes are oversized—visibility is unequalled. These are the trucks the men in the field asked for—proving again . . .

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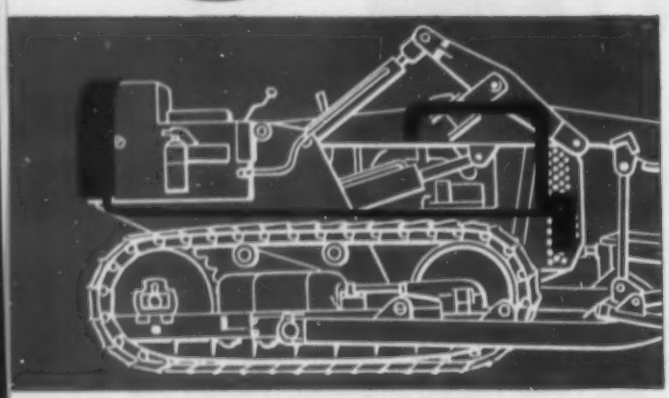
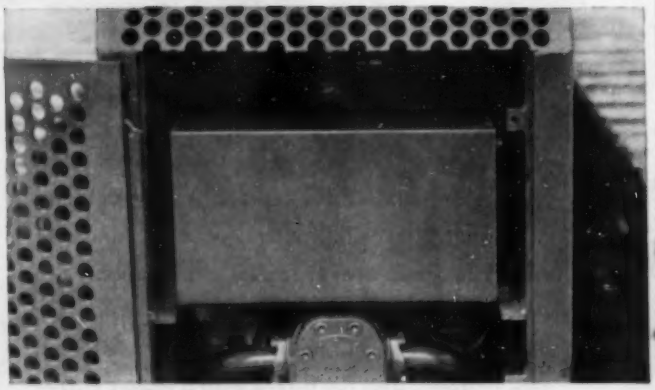
FACTORY AND HOME OFFICE: SEATTLE, U. S. A., DISTRIBUTORS IN THE UNITED STATES AND MOST FOREIGN COUNTRIES

NEW International® TD-9

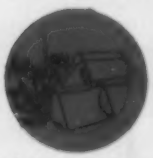


Compact, stainless steel scrubber is mounted neatly behind the radiator guard. No external "plumbing." Engine cooling is unaffected. Owner gets maximum 71 net hp. Scrubber cools exhaust gas from about 1000° F. to maximum 160° F., also removes harmful irritants.



Scrubber and diffuser are easily accessible for servicing by opening radiator guard door. Diffuser breaks up cooled exhaust gas...regular engine fan blows air through gas at a ratio of 25-30 to 1, rendering final exhaust gas harmless to personnel, minimizing fire hazard.

NOW...get unmatched versatility underground with Drott special attachments



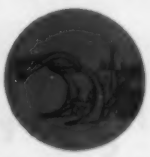
Exclusive Drott Four-In-One is a dozer, bucket, clamshell, and bullclam all in one ...a versatile utility tool for loading and clean up.

95-inch Drott bulldozer blade mounts directly onto Skid-Shovel lift arms. Depth of cut regulated by hydraulic control of blade pitch.

Drott angledozer blade ditches, slopes, dresses...can be set to either side. Operator tilts blade from seat.

Rock fork constructed of super-strong alloy steel ... withstands abrasion of loading hard, tough minerals.

Third, extra valve of Drott Skid-Shovel, controls rear-mounted heavy-duty scarifier ...for tearing up ore beds.



Low profile, 2-prong grapple with top grab arm loads ties with full control.

Pallet fork lift attachment has two adjustable prongs for mounting of platform for drill jumbos or roof bolting.

Underground Mining Tractor

featuring...

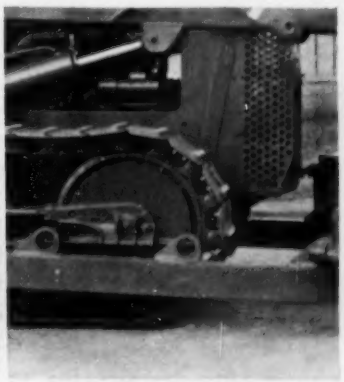
- **New, compact, exhaust gas scrubber... safe, integrally mounted!**
- **New 24-volt direct electric starting!**
- **New, low 6-foot height!**
- **Plus a complete line of interchangeable International Drott mining equipment!**

Now, International Drott announces a new crawler tractor completely designed and equipped for underground mining operations! Unusually compact and clean in design, the new tractor meets the U. S. Bureau of Mines' new safety standards for non-coal operations. It features the new Drott short-coupled, built-in exhaust gas scrubber and cooler. A new exhaust gas diffuser works together with the regular engine blower fan. And it has a new 24-volt, direct electric starting International diesel engine.

The new tractor has been lowered to 6 ft. to permit safe transport on low rail beds under low trolley wires. *Its length has not been changed* by the addition of scrubber and water reservoir tank.

The new TD-9 offers unmatched versatility and flexibility. It takes the standard 1½ cu. yd. Drott shovel, plus a narrow 46" shovel for tram car loading, straight and angledozer blades, special buckets, and the exclusive Four-In-One. Be sure to see the remarkable new TD-9 at the American Mining Congress.

Large 40-gallon capacity reserve water tank is mounted behind fuel tank, does not extend beyond drawbar. Capacity is sufficient for full eight-hour shifts. Level of water in scrubber is maintained at 4 inches by a stainless steel float.



For extremely heavy duty work, International bulldozer or bull-grader blades with separate outside push frames are also available.

INTERNATIONAL HARVESTER

INTERNATIONAL® Construction Equipment

International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

Nordberg

GRINDING

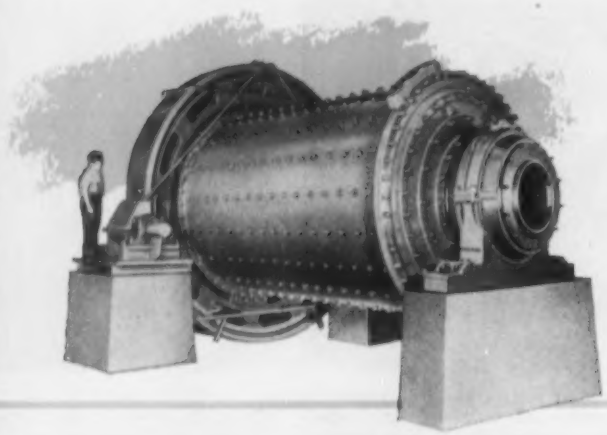
. . . built to meet the exacting requirements of the MINING INDUSTRY

NORDBERG MACHINERY is the result of specialized engineering skills aided by unsurpassed manufacturing facilities. For over half a century Nordberg has produced heavy machinery for the mining industry, which has become well known all over the world for its advanced engineering, excellent construction, high efficiency and dependable service.

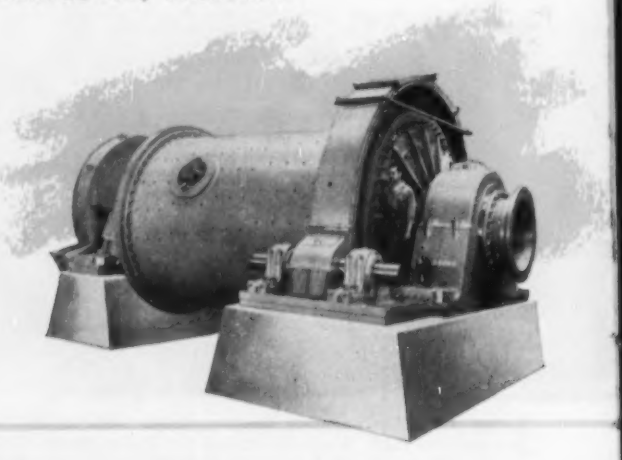
Included in this broad line of heavy machinery is the complete line of Nordberg Grinding Mills, designed and built to meet the most exacting requirements of the mining industry . . . for wet or dry grinding of metallic and non-metallic minerals, and in other processes where friable material must be comminuted to fine sizes.

Nordberg Grinding Mills are manufactured in sizes ranging from 6 to 13 feet in diameter and up to 50 feet in length. Types include Ball, Pebble, Rod, Tube and Compartment Mills.
Write for further information.

NORDBERG MFG. CO., Milwaukee, Wisconsin



• Typical Nordberg dry grinding Rod Mill, measuring 10'-6" in diameter by 16' in length, for ore processing service. Mills of this type are in wide use in the mining industry, delivering maximum output at lowest possible cost.



• View showing discharge end of Nordberg 10'-8" x 17' wet grinding Ball Mill with Scoop Feeder. Whether wet or dry process, open or closed circuit operation, there is a Nordberg Grinding Mill built for the job.

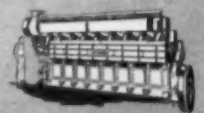
SYMONS GYRATORY CRUSHERS

SYMONS CONE CRUSHERS

NORDBERG KILNS AND COOLERS

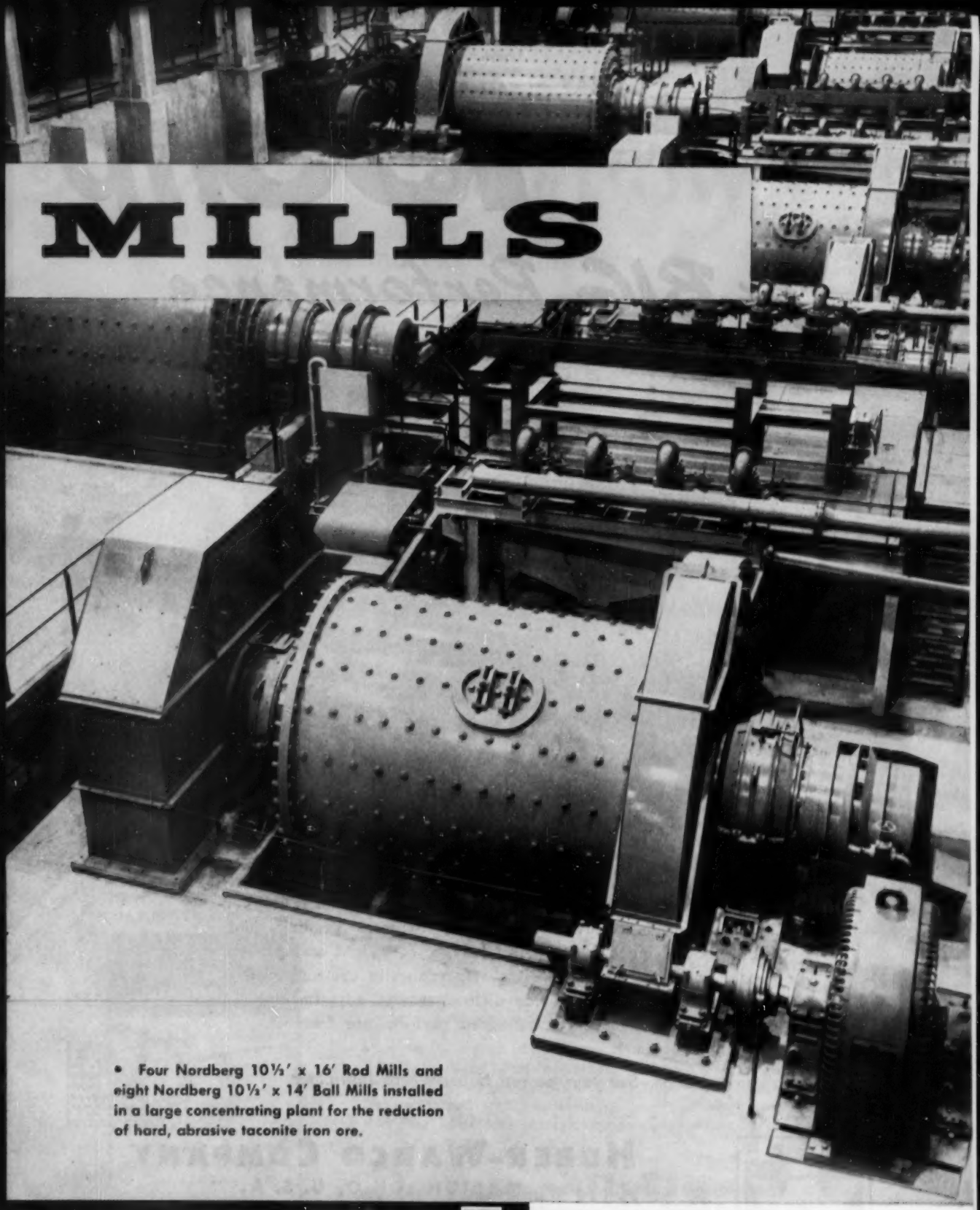
NORDBERG MINE HOISTS

SYMONS VIBRATING GRIZZLIES AND SCREENS



NORDBERG DIESEL • DUAFUEL® and SPARK-IGNITION GAS ENGINES

MILLS



• Four Nordberg 10½′ x 16′ Rod Mills and eight Nordberg 10½′ x 14′ Ball Mills installed in a large concentrating plant for the reduction of hard, abrasive taconite iron ore.

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MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

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SYMONS...

A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

GM-156

195hp

for BIG Performance

HUBER-WARCO 5D-190 GRADER

The Huber-Warco 5D-190, with torque converter and full power-shift transmission, will handle the toughest grading jobs smoothly and quickly. A perfect balance of weight and power gives highest working efficiency. Hydraulically cab-controlled blade movement (90° either side with no manual adjustments) and power-sliding moldboard are added performance features.

For a demonstration—See your nearest Huber-Warco Distributor

HUBER WARCO

HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

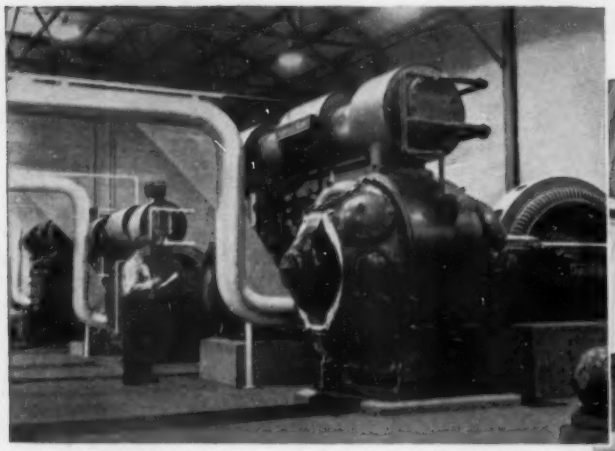
Road Machinery

CABLE ADDRESS: HUBARCO

ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

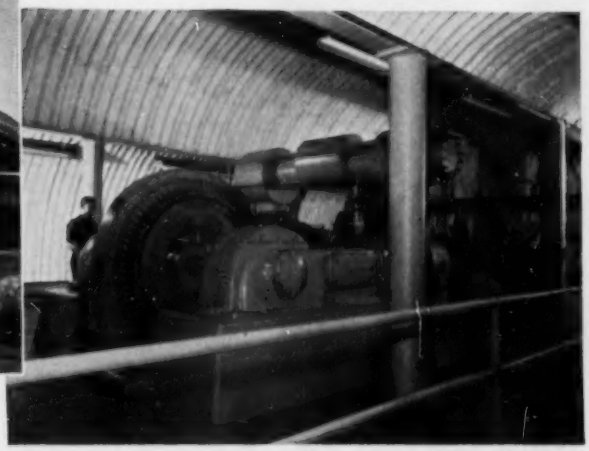
11,000 ft UP
or 4,000 ft DOWN

Ingersoll-Rand PRE Compressors keep rock drills working at top efficiency



Installed at an elevation of 11,500 feet above sea level, three 800-horsepower and two 600-horsepower Ingersoll-Rand PRE compressors, two of which are shown here, supply 100-psi air for Ingersoll-Rand rock drills at Climax Molybdenum Company's two-level development mining at Climax, Colorado. The modern compressor building is located on the surface, directly above the mine workings, which contributes to maximum efficiency for air distribution.

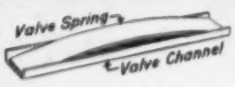
This dependable supply of air power helps keep pressure up to 90 to 100-psi at the cutting faces, thus assuring optimum results for the drilling operations which enable Climax to produce approximately 30,000 tons of ore per day.



Way down underground on the 1200 level, this 400-horsepower Ingersoll-Rand PRE compressor and two smaller units provide 100-psi drilling air for zinc and lead mining operations in Bunker Hill's Star Mine in the Coeur d'Alene district in Idaho.

Located 1200 feet below the shaft collar, these units feed into the same air line as another PRE unit on the *4,000 level*. With dependable I-R compressors at both ends of the system, line losses are reduced and full pressure is maintained at the drills.

Only I-R Compressors have CHANNEL VALVES



- High Efficiency
- Quiet Operation
- Remarkable Durability
- Air-Cushioned Action
- Corrosion-Resistant
- Channels are rigid
- Entirely different

Ingersoll-Rand PRE Compressors, of the horizontal, double-acting crosshead type, are heavy-duty machines built for continuous full-load service. Their extra stamina and low maintenance are big assets in mining service. The completely sealed frame keeps out dust and dirt. Running gear requires no internal adjustments.

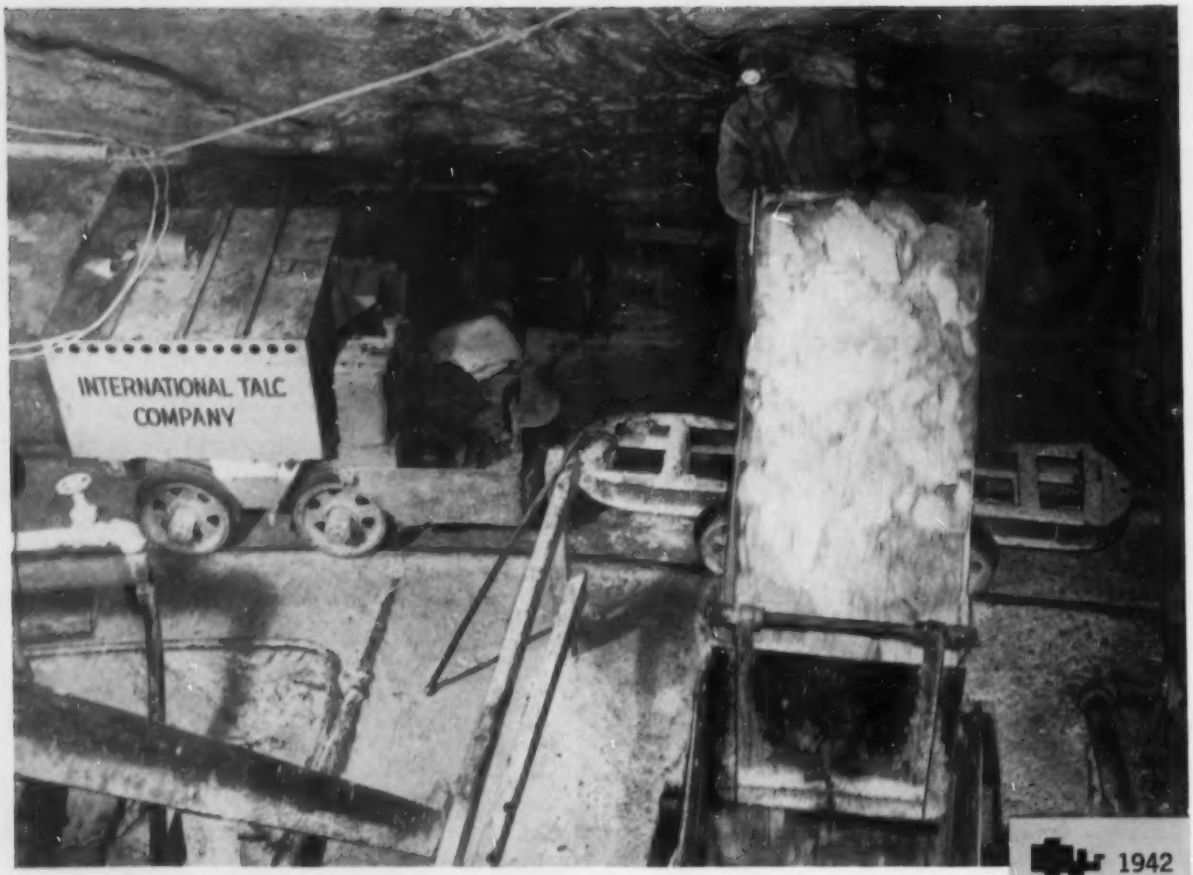
Pipeless force-feed lubrication cuts operating and maintenance costs. These and many other features make the PRE an ideal compressor for use wherever large volumes of air are to be handled and pressures must be maintained within close limits over the complete capacity range. Ask your I-R representative for complete information.

Ingersoll-Rand IR

1-431

11 Broadway, New York 4, N. Y.

COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS



Mancha's Little Trammer...

How one good thing leads to another

In 1942, International Talc Company got its first Little Trammer to haul rock and ore. So well did this rugged 1½ ton powerhouse do its job that in '45 another Little Trammer was purchased; a third in '47 and a fourth in '49.

Then a merger of International Talc with another talc company revealed an almost identical experience with the Little Trammer. The second company had purchased one each year in '42, '44, '45, '48 and '51 . . . five in all.

So today International Talc has a fleet of nine Mancha's Little Trammers. And not only are they hauling ore and waste with ease and economy, but are also used for a variety of service work. They've paid for themselves over and over and are good for many more years of service.

Are you interested in details about this wheeled workhorse? We'll be glad to supply them . . . without obligation. Be sure to see Mancha's Little Trammer at Booth 524, Los Angeles Mining Show.

1942
1942
1944
1945
1945
1947
1948
1949
1951

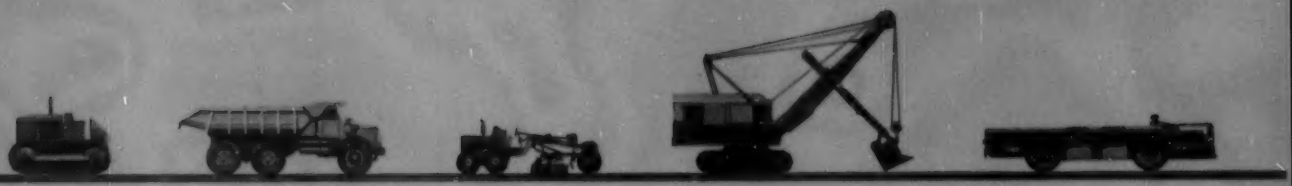
9

MANCHA STORAGE BATTERY LOCOMOTIVE

DIVISION GOODMAN MANUFACTURING COMPANY

Halsted Street and 48th Place • Chicago 9, Illinois • Cable Address: Mancha, Chicago
Mancha representatives are located in principal mining areas throughout the world.

Use mining equipment?



. . . now you can

STANDARDIZE ON CUMMINS

CUMMINS diesels give you the *big plus* MORE PROFIT

CUMMINS

diesels deliver

New NRT-6 Cummins Turbodiesel *delivers 300 horsepower. This is one of five new Turbodiesels by Cummins. The others: 175 h.p. (model JT-6); 250 h.p. (model NT-6); 262 h.p. (model NTO-6) and 600 h.p. (model VT-12). Turbocharging harnesses exhaust gas energy normally wasted, results in higher horsepower output without increasing engine size or displacement.*

features you need.... profits you want

1	**Exclusive PT fuel system** now standard on all Cummins Diesels. Easier to understand, simpler to service than any gasoline system or any other diesel fuel system.	Drastically reduces fuel system maintenance costs. Eliminates fuel racks, check valves, injection valves, timing adjustments.
2	**Cummins exclusive injectors,** open-type combustion chambers, and 4-cycle operation give highest on-the-job efficiency . . . and maintain it throughout operating range.	With Cummins Diesels, you can cut fuel costs from $200 to $500 or even more for every thousand hours of operation (compared with other diesel engines).
3	**Continuing research,** exacting engineering standards, and strict quality control assure product uniformity and high-quality, rugged heavy-duty design.	You get more operating hours between overhauls, less in-between maintenance and less unscheduled downtime when you use Cummins Diesels.
4	**Twenty-four** basic Cummins Diesels of 60 to 600 h.p. provide a wide selection of power. There are over 150 models—plus a wide variety of accessories—to match every individual job.	By matching power to your job you avoid the possibility of excessive maintenance and fuel costs resulting from under-powering . . . excessive initial costs inherent in over-powering.
5	**Standardization** of internal parts. Bearings, pistons, crankshafts and other parts are interchangeable for many models.	Reduced inventories and greater parts economy are made possible by this standardization. You get lower over-all maintenance costs.
6	**Worldwide** service and parts supply. Cummins Distributors carry all parts necessary to keep your engine running in top form . . . have factory-trained experts available to give immediate service.	Service and parts are available in nearly 200 locations in the United States and Canada and in over 100 export locations—help cut on-the-job delays.

Cummins Diesels are available in the leading makes of mining machinery. On the following pages are shown the makes of equipment in which you can obtain the advantages of Cummins Diesel power.

Before you place an order for new equipment, make sure you're getting lowest fuel and maintenance costs, minimum downtime, longest life. Specify Cummins and be sure you get all these diesel advantages.

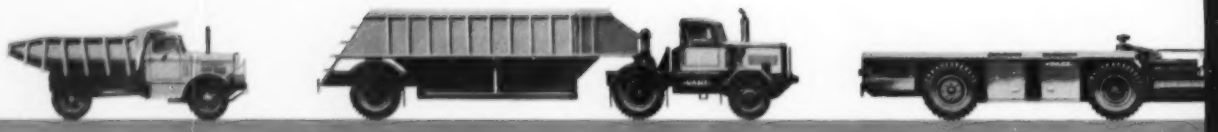
CUMMINS DIESELS

give you the big plus

MORE PROFIT

CUMMINS

diesels now available



AUTOCAR end-dump truck with 10 ¼ yard rock body. One of many Autocars with Cummins as standard power.

DART 50-ton coal hauler powered by 300 h.p. Cummins. Cummins Diesels are standard power in these coal haulers.

DART 18-ton underground shuttle truck. Available powered by 300 h.p. Cummins Diesel torque converter unit.

EUCLID 50-ton end-dump truck. One of many Euclid dumps and coal haulers that can be powered by Cummins.

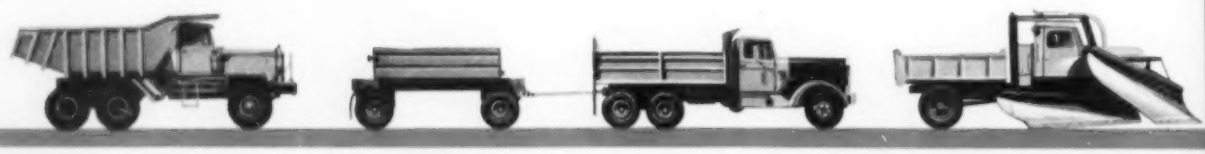
FOUR WHEEL DRIVE quarry and mine maintenance truck. One of two FWD's available with Cummins.

HAYES, model HD series dump truck. This Canadian-built truck is powered by 165 horsepower Cummins Diesel.

HENDRICKSON 40-ton dump truck. One of twelve Hendricksons available with Cummins Diesels.

IH 35-ton quarry truck with twin side-dump. There are 17 other IH trucks you can buy equipped with Cummins.

KENWORTH 24-ton end-dump truck. One of many Kenworth models in which Cummins Diesels are standard.

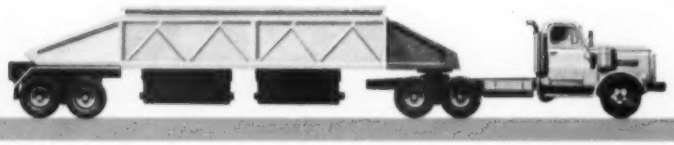


MACK 34-ton end-dump truck. One of fifteen different Mack models available with power by Cummins.

PETERBILT end-dump truck with side-dump trailer. One of 6 Peterbilt trucks in which Cummins power is standard.

WALTER, model ACBS Snow Fighter equipped with a 200 horsepower Cummins Diesel.

in these famous-make TRUCKS

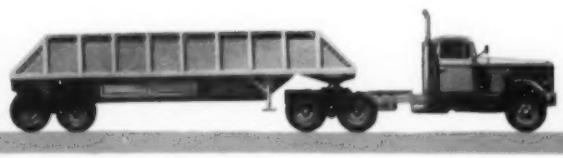


COOK 30-ton bottom-dump truck. Cummins Diesels also available in end-dump and ready-mix units.

DIAMOND T 921 series tractor with low-boy trailer. Ten Diamond T models available with Cummins Diesel engines.

OSHKOSH 35-ton hauling truck with side dump trailer. One of eleven Oshkosh models available with Cummins Diesels.

PACIFIC 11-yard end-dump truck. One of many Pacific trucks in which you get Cummins as standard power.



WHITE 35-ton bottom-dump gravel hauler. One of thirty-four White-built trucks available with Cummins Diesels.

For over twenty years, major mine operators have picked Cummins Diesels as the top engines for heavy-duty off-highway trucks. Today, Cummins continues to be the first choice for the rough, tough haulage jobs.

Dependable day-in, day-out performance, ability to get more work done, long life, and lowest possible fuel and maintenance costs are a few of the reasons for this leadership.

In addition to heavy-duty earth haulers, Cummins Diesels are also available in smaller trucks used as dumpers in over-the-highway service.

When you buy new heavy-duty or medium heavy-duty mining trucks, get maximum efficiency . . . top profit. Specify Cummins.

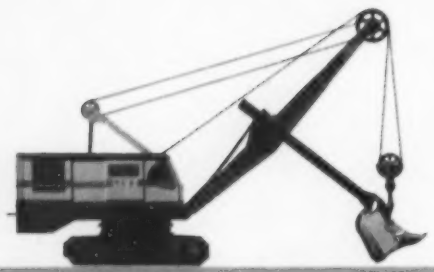
CUMMINS DIESELS

give you the big plus

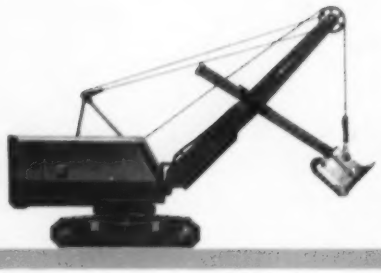
MORE PROFIT

CUMMINS

diesels now available

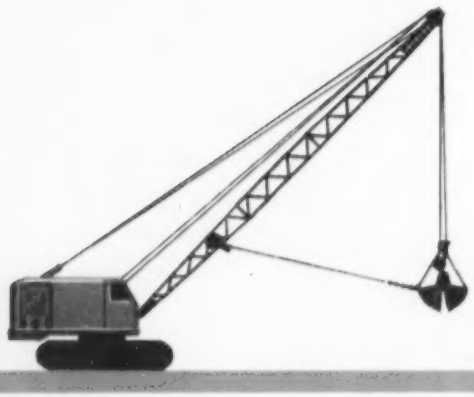


BUCYRUS-ERIE 2½-yard shovel. Cummins Diesels are also available in Bucyrus' 1½- and 4-yard shovels.

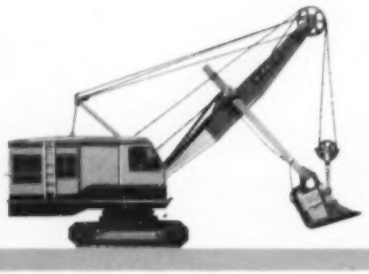


LINK-BELT SPEEDER 2½-yard shovel. Link-Belt Speeder also makes two draglines available with Cummins.

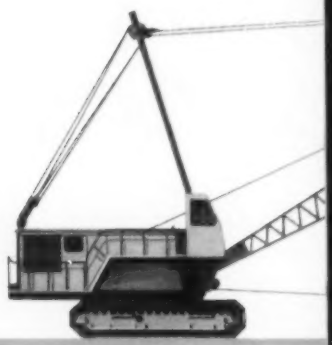
DOMINION backhoe. This unit, convertible to other front-end attachments, is available Cummins powered.



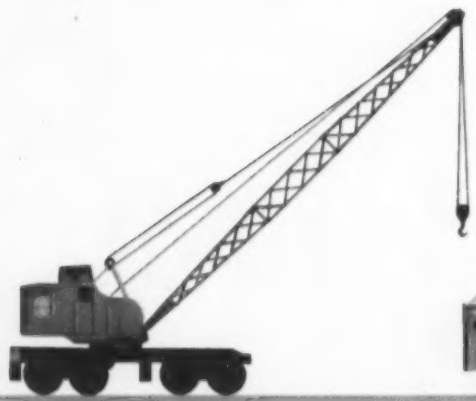
AMERICAN crawler crane. Cummins are available in the 700 series of American shovels, backhoes, and cranes.



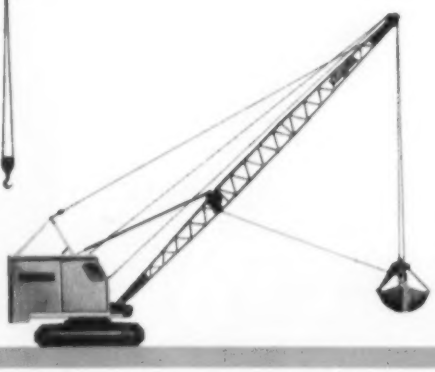
KOEHRING 2½-yard shovel. A 275 h.p. Cummins torque converter package is available in this unit.



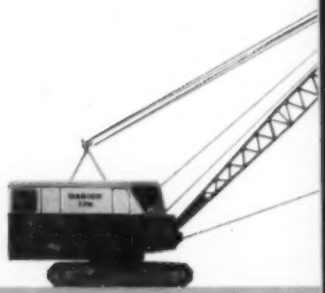
MANITOWOC 5-yard dragline. Manitowoc also powers five shovels (1- to 5-yard) and a crane with Cummins Diesels.



INDUSTRIAL BROWN-HOIST rubber-tired diesel-electric crane. Available in capacities from 25 to 60 tons.



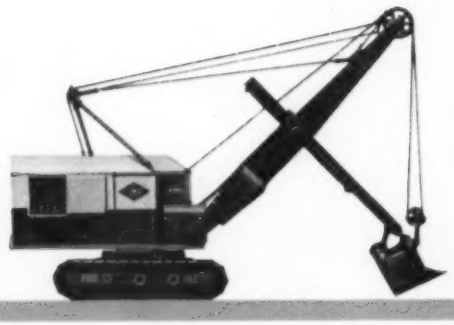
BAY CITY BAY CITY clamshell. Bay City's crane and 1½-yard shovel also feature Cummins Diesels as standard equipment.



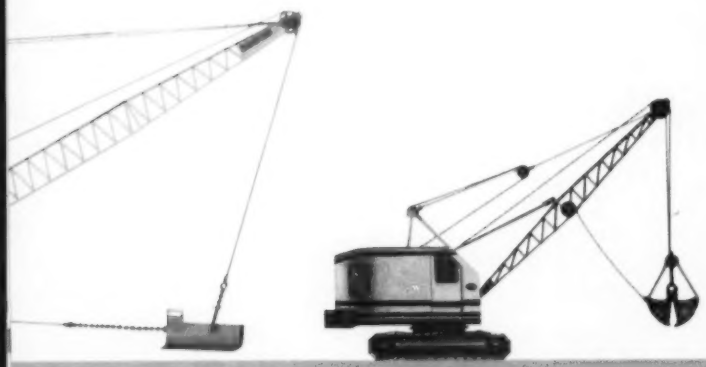
MARION dragline. One of three draglines, six shovels (1¼- to 4-yard), two cranes—available with Cummins power.

in these famous-make

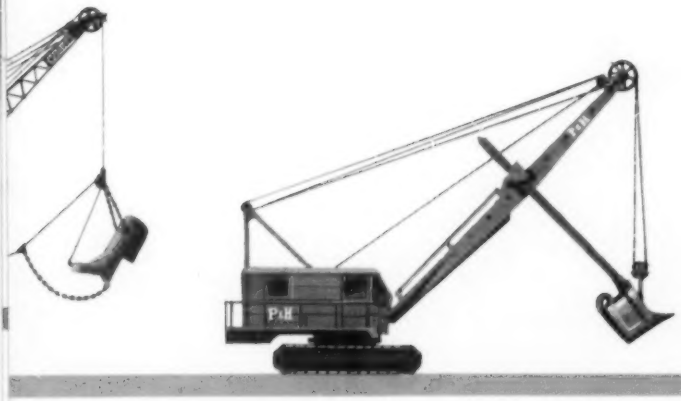
SHOVELS DRAGLINES CRANES



LIMA 2½-yard shovel. Eight different Lima models (¾- to 4-yard) can be bought equipped with Cummins Diesels.



INSLEY 1-yard clamshell. Also as shovel, hoe, dragline, crane: on crawler, truck, or self-propelled mounting.



P&H model 1055 3½-yard shovel. Also available as a dragline, crane and clamshell. All available Cummins powered.

Cummins Diesels in your shovels, draglines, or cranes assure you of longer equipment life, lower maintenance and fuel costs . . . performance you can count on. That's why leading manufacturers make their ¾- to 5½-yard shovels available with Cummins Diesels.

Cummins engines for mechanical drive shovels have been engineered to include the best torque characteristics, controls, and accessories for each model of machine.

To assure best performance and lowest operating cost, torque converter units have been specially designed by Cummins to fit individual shovel models. Shovels equipped with Cummins torque converter units maintain power without lugging, stalling, or overspeeding. On the job, they have increased production by 30% to 50%. The hydraulic coupling effect of torque converter units also reduces maintenance costs on cables and machinery by absorbing shock loads.

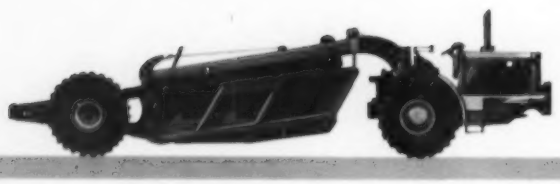
CUMMINS DIESELS

give you the big plus

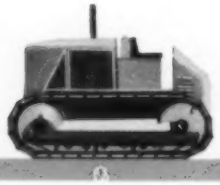
MORE PROFIT

CUMMINS

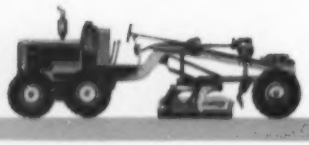
diesels now available

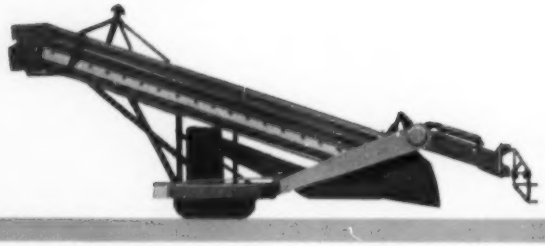


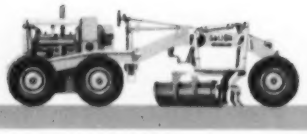
INTERNATIONAL HARVESTER model 75 Payscraper. Model 55 Payscraper is also Cummins powered.



EIMCO model 105 crawler tractor. Eimco also makes a bulldozer and tractor-loader available with Cummins.



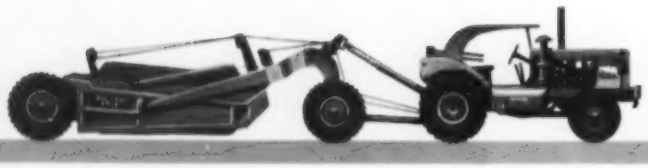


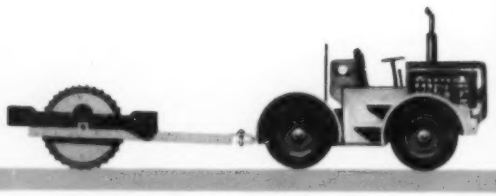


ADAMS motor grader. Adams division of Le Tourneau—Westinghouse offers its model 660 powered by Cummins.

EUCLID loader. This Euclid belt-conveyor can be bought powered by a Cummins Diesel.

GALION model T-700 motor grader. This motor grader is available with a 190 h. p. Cummins as standard power.





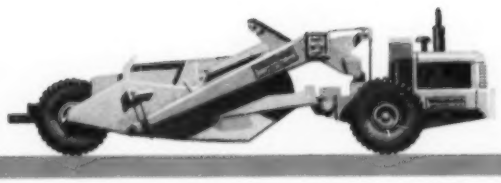
M-R-S four-wheel tractor. This is one of four M-R-S tractors available with Cummins Diesels.

WAGNER 4-wheel drive tractor with sheepsfoot. One of two rubber-tired tractors available Cummins powered.

in these famous-make

EUCLID 18-yard twin-engine scraper. One of three Euclid scrapers you can buy powered by Cummins.

LE TOURNEAU-WESTINGHOUSE "B" Tournapull. Cummins also powers the "C" and a Tournatractor.



WOOLDRIDGE 18-yard "Terra Cobra" scraper. Seven "Terra Cobra" scrapers and dumpers use Cummins power.

TRACTORS
GRADERS
SCRAPERS
LOADERS

Cummins Diesels give you the high torque needed for 'dozing, pushing, loading . . . fast acceleration . . . sustained high speeds on the haul. On mining jobs, you will find Cummins power in the rubber-tired tractors that pull the biggest scrapers—push the biggest 'dozer blades.

Cummins Diesels are now standard in 7 motor graders from 80 to 190 h.p. These machines do your grading and ditching jobs faster, better and more economically.

You now can get Cummins power in crawler tractors, too. Driving through a torque converter, a new 120 h.p. Cummins gives these tractors greater drawbar pull than all other tractors of their class—makes them outpull and outperform most tractors of heavier classifications.

CUMMINS DIESELS

give you the big plus

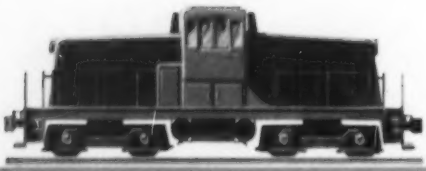
MORE PROFIT

CUMMINS

diesels now available

BALDWIN-LIMA-HAMILTON locomotive. One of six switching and mine locomotives available with Cummins power.

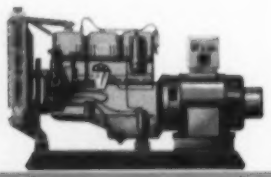
DAVENPORT BESLER DAVENPORT industrial switcher. Cummins Diesels are offered in nine Davenport models, from eight to sixty tons.



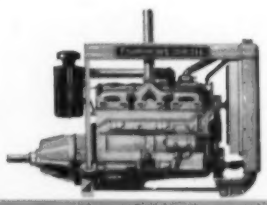
GENERAL ELECTRIC 80-ton industrial locomotive. A standard line of diesel electrics from 25 to 95 tons available Cummins-powered.

WORTHINGTON "Blue Brute" 315-foot rotary air compressor. Available powered by a Cummins 120 h.p. Diesel engine.

Standardize on Cummins for generators and power units, too!



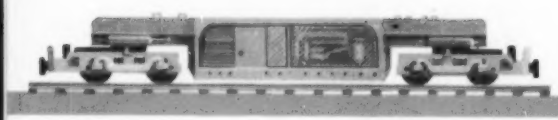
GENERATOR UNITS. Cummins makes lightweight, compact generator units—30 to 250 kw—adaptable to either portable or stationary applications. Simplicity of design minimizes installation expense. The low fuel consumption and small costs of maintaining Cummins Diesels are the reasons why power users have found that Cummins generator units give them the lowest cost per kilowatt hour.



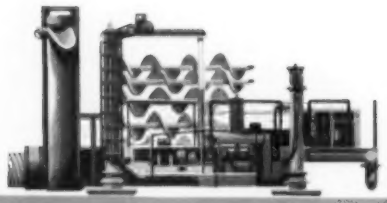
POWER UNITS. Cummins makes a complete line of rugged, heavy-duty industrial engines—60 to 600 h.p.—adaptable to an extremely wide range of applications, both portable and stationary.. These engines can be furnished as straight industrial units (fan to flywheel) . . . as complete power units with radiator cooling, hood, and clutch power take-off . . . or with a wide variety of accessories.

in these famous-make

LOCOMOTIVES
AUGERS
HOISTS
DRILLS



GENERAL ELECTRIC GENERAL ELECTRIC 40-ton underground locomotive. This unit comes powered by a Cummins 600 h.p. Diesel.



COMPTON COMPTON model 28 coal auger. One of five Compton coal augers you can buy powered by Cummins Diesels.

No matter what phase of mining work you specialize in . . . no matter what type of equipment you use most . . . you can be sure of maximum efficiency, *more profit* when you standardize on Cummins Diesels. There's no surer way of increasing production . . . cutting costs.

The mining equipment shown on these pages is only a sample of the wide variety of units available with Cummins power. All incorporate the latest engineering advances to let you do more jobs faster, better, and cheaper.

For further information, contact your Cummins Distributor or your equipment dealer, or mail coupon today.

CUMMINS DISTRIBUTOR
(See address on back cover)

I am interested in finding out more about Cummins Diesel advantages.

☐ Send me, free of charge, your directory of manufacturers offering Cummins Diesels in their equipment.

☐ I want details on repowering my present equipment. Please have your representative call.

Name_____ Position_____

Company_____

Address_____

CUMMINS DIESELS
give you the big plus

MORE PROFIT

Here's what you get when you standardize on Cummins!

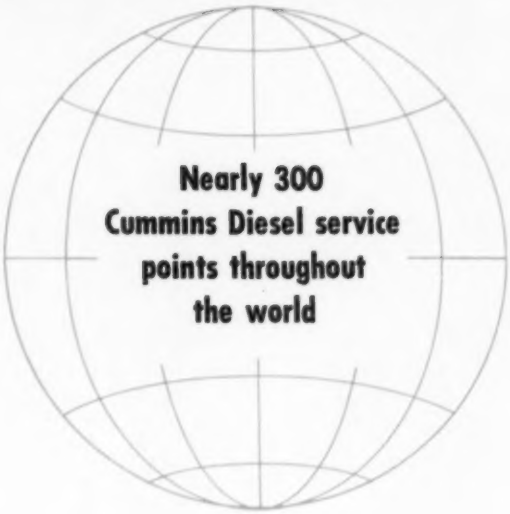
Maximum Equipment Availability — Cummins rugged basic engine design has the proven superiority of the 4-cycle operation. High-strength metals and alloys (Stellite valve seat inserts, on *both* intake and exhaust ports, for example) cut scheduled maintenance and unscheduled downtime to a minimum.

Greater Diesel Economy — Use Cummins Diesels as standard power in your machines . . . and you are assured of maximum fuel and maintenance economy. Over 150 models permit pinpoint matching of power to job.

Cummins PT Fuel System — Cummins exclusive PT fuel system drastically reduces fuel system maintenance costs while permitting the engine to operate at top performance. It is easier to understand and service than any other diesel or gasoline fuel system.

Interchangeability of Parts — Wherever possible, Cummins has standardized internal engine components (bearings, pistons, crankshafts and many other parts). This lets you keep a smaller parts inventory . . . reduces your dollar investment in parts.

Expert Service and Parts Help — Cummins worldwide distribution network — devoted to the sales and service of Cummins Diesels — keeps factory-type maintenance and genuine Cummins parts near at hand. Special service and parts availability at job-site is another big plus.



Over 45 famous manufacturers of heavy equipment offer Cummins Diesels as power in over 200 models.

CUMMINS MORE PROFIT

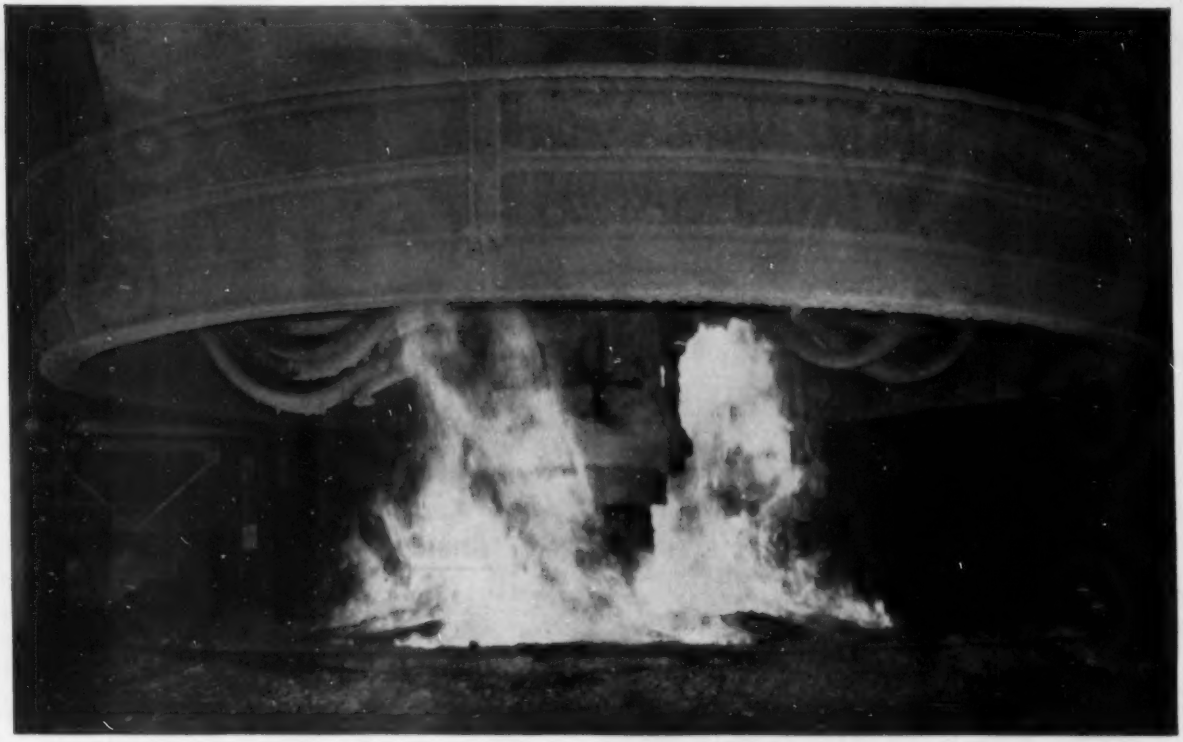
gives you the big plus

Printed in U. S. A.

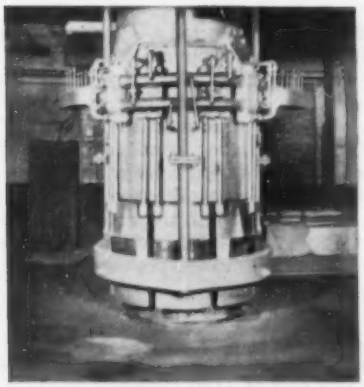
For further information consult the Cummins Distributor in your area or write direct to:

Cummins Engine Company, Inc.

Columbus, Indiana



After two years of slipping-under-load, no replacements of contact shoes and clamps!



40-inch Lectromelt self-baking electrode clamp assembled on our erection floor for testing.

Load has been boosted 40% above the original rating

LECTROMELT electrode holders have turned in a remarkable performance on a 9,000 KVA ferrosilicon furnace on the West Coast. The furnace was down recently for slight alterations, so the engineers were able to examine these holders carefully.

Electrodes are slipped under load. Since that load has been boosted 40% above the original design rating, severe demands are placed on contact shoes and clamps. Even so, no replacements were required after two years of intensive service. These Lectromelt shoes and clamps went back into service when the furnace was started up.

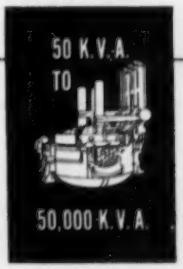
This ability of Lectromelt furnace equipment to meet exacting service requirements accounts for its popularity all over the world. For a copy of Catalog 105, write Lectromelt Furnace Company, 324 32nd Street, Pittsburgh 30, Pennsylvania (a McGraw Electric Company Division).

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa . . . JAPAN: Daido Steel Co., Ltd., Nagova

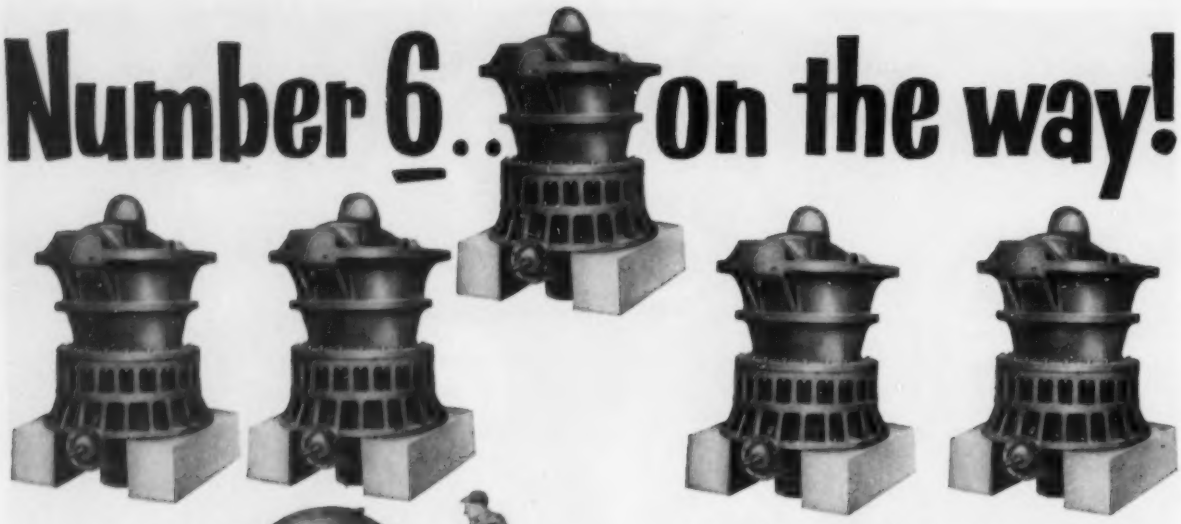
*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

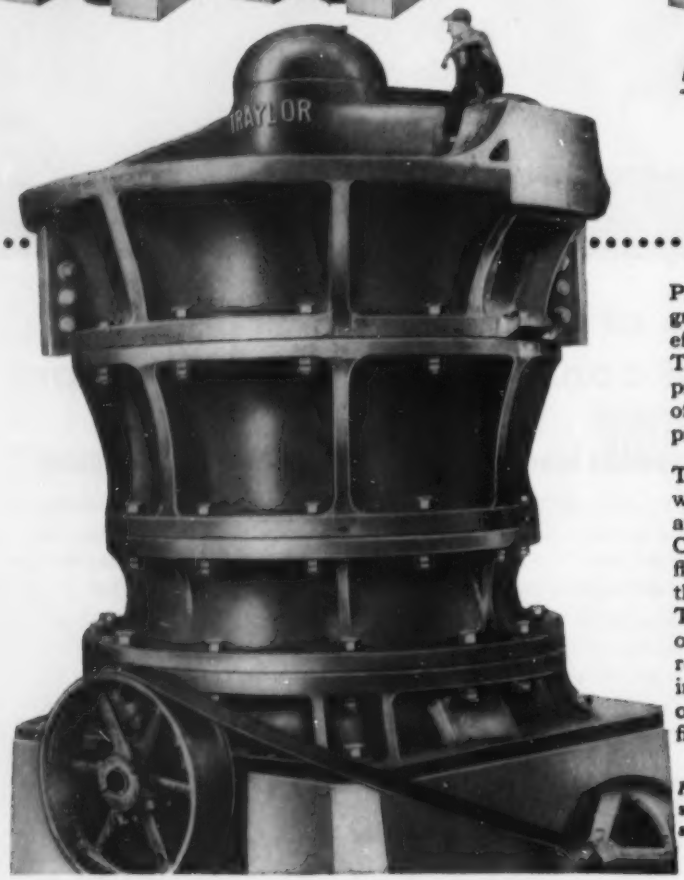
WHEN YOU MELT... *Lectromelt*



Number 6 . . . on the way!



Another Traylor TC Gyratory is added to the 5 on order for Big Taconite Project



Profitable production of iron ore from low-grade Taconite calls for the most modern, efficient methods and equipment. That's why Traylor Gyratories were the choice for both primary *and* secondary reduction at one of the extremely hard Taconite-bearing ore properties.

The initial order included a Gyratory Crusher with 60" receiving opening and 102" diameter crushing head, this huge TC Primary Crusher takes chunks of ore the size of a flat-top desk and reduces them to 12" at the rate of 4,000 long tons an hour. Four Traylor 36" Gyratories were included on the original order . . . to take the 12" ore and reduce it to minus 5" in the secondary crushing operation. Now . . . we've received an order for another 36" Gyratory to join the five now being built.

For complete specifications and description of the outstanding features of Traylor TC Gyratory Crushers, send for your copy of Traylor Bulletin #126.

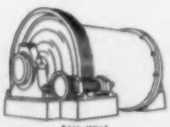
TRAYLOR ENGINEERING & MFG. CO.
857 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York · Chicago · San Francisco
CANADIAN MFRS: Canadian Vickers, Ltd., Montreal, P.Q.

Traylor


PRIMARY GYRATORY CRUSHERS


ROTARY KILNS


SECONDARY GYRATORY CRUSHERS


BALL MILLS


JAW CRUSHERS


APRON FEEDERS

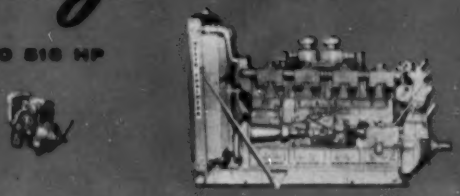
IT'S Allis-Chalmers ENGINES for *any* Power Need

any FUEL

DIESEL . . . GASOLINE
LP GAS . . . NATURAL GAS

any SIZE

9 TO 816 HP

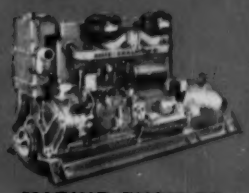


any TYPE

OPEN OR ENCLOSED POWER UNITS

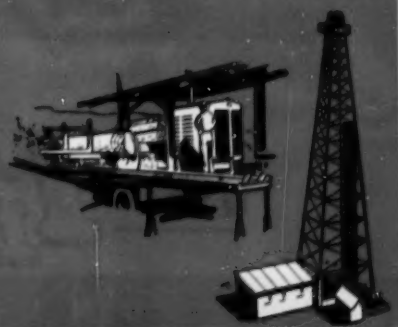
GENERATOR SETS

FAN-TO-FLYWHEEL ENGINES



MARINE ENGINES

any USE



Make your Allis-Chalmers Engine Dealer your main source of power for all your engine needs. He can supply a wide range of engines for any fuel — gasoline, diesel, LP gas, natural gas — for any use . . . stationary or mobile-power units, fan-to-flywheel engines, generating sets or marine engines. Each has the high-efficiency, long-life characteristics necessary for continuous as well as stand-by service. With a high degree of interchangeability of parts, you can use a different type of engine for each application and yet maintain a small stock of parts.

Write for bulletins or see your Allis-Chalmers Engine Dealer for more information.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

See us at the
MINING SHOW — Oct. 1-4
Los Angeles, California
Booths 812 and 701

ALLIS-CHALMERS

BE-4

To move more dirt USS "T-1" Steel is used in WORLD'S LARGEST POWER SHOVEL

WORLD'S LARGEST power shovel is the new Marion Type 5760. With a 150-foot boom, and a dipper capacity of 60 cubic yards, it has a working weight of about 5,500,000 lbs. Hanna Coal Co. is using it to strip over-burden to an average depth of 90 feet.

CROWD RACK is 42 feet long, made from seven pieces of USS "T-1" Steel 6½" x 34½" x 73½". Gear teeth are machined into these sections, then the pieces are heat-treated, flattened, finish-machined, and welded together. The "T-1" rack is stronger than a cast rack would be, eliminating the fear of breakage and deformation.

SIXTY CUBIC YARDS at one bite. The entire bucket, bail, dipper stick and crowd rack are made of USS "T-1" Steel. The very high strength (minimum yield strength of 90,000 psi and minimum tensile strength of 105,000 psi) of "T-1" Steel enabled the designers to combine maximum strength with lightweight construction. Result: *Capacity*. Thanks to USS "T-1" Steel, the bucket moves more dirt than any other shovel bucket in the world.

UNIQUE. USS "T-1" Steel's unique combination of high strength, extraordinary toughness, resistance to impact and abrasion, and excellent weldability helped spell efficiency and operating economy in this shovel. "T-1" Steel is finding wide application in mining and construction equipment, bridges, pressure vessels, and other products where light weight, extreme ruggedness, and durability at low temperatures are needed. USS "T-1" Steel's ease of fabrication cuts costs in many applications. Write for more information. United States Steel, Room 5358, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS "T1" CONSTRUCTIONAL ALLOY STEEL

USS

UNITED STATES STEEL

"Wire sculpture by Henry Szeferz"

The Right Pick is important. That applies to choice of trailing cords and cables, too. Be guided by the fact that veteran mine-men prefer TIREX. This expertly engineered cable, newly improved for greater flexibility, has cured-in-lead Neoprene Armor that resists abrasion, oil, heat and water . . . gives maximum wear.

SIMPLEX WIRE & CABLE CO.,
79 Sidney Street,
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Visit us at BOOTH 1048
Mining Congress Show

LIVE BETTER ELECTRICALLY

Simplex–TIREX

TONNAGE

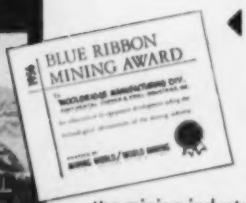
takes on new meaning with tomorrow's mining methods today

35 TON COBRAHAUL QUAD

Giant high-speed 300 hp dumper with speeds over 32 mph—featuring fluid coupling drive, dual hydraulic dumper actuation, rugged 3-axle stability, big wide base tires.

Through two decades, Wooldridge engineers have pioneered high production earthmovers which make today's open pit mining methods profitable. Rugged new fast-moving Wooldridge models now going into the field are again setting the standards of tomorrow. In addition to examples shown here are the 28-ton Cobra Quad, largest 3-axle scraper built; Cobra 2-axle self-propelled scrapers in the 17 to 20-ton class; a complete range of tractor-drawn scrapers rated from 14 to 52 tons, rugged Cobrahaul dumpers carrying 20 to 35 tons; heavy duty rippers, and cable control units. For more profitable mining in the modern manner, get full details on the Complete Scraper Line from your Wooldridge Distributor.

FAST 13 TON COBRETTE—New all-purpose self-propelled scraper already in extensive use, stripping overburden, digging and hauling ore of various types. It is the only unit built to "team load" with two units push loading each other. Long wide low bowl profile makes scraper loading fast and easy, presents ideal target where shovel loading is indicated. The Cobrette has fluid coupling drive, exclusive Gear Steer.



52 TON WOOLDRIDGE—M-R-S SCRAPER

World's largest scraper, Wooldridge OS-300B, teamed with 500 hp M-R-S tractor. This scraper is the 1956 blue ribbon winner for achievement in equipment development aiding in the technological advancement of the mining industry, awarded by Mining World and World Mining. The photograph shows one of a fleet of 11 Wooldridge—M-R-S units in a multi-million yard stripping operation for a new mining pit near Tucson, Arizona.

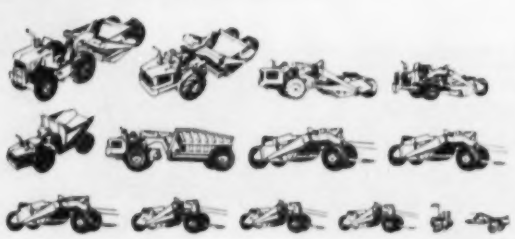
THE COMPLETE SCRAPER LINE

WOOLDRIDGE

WOOLDRIDGE MANUFACTURING DIVISION

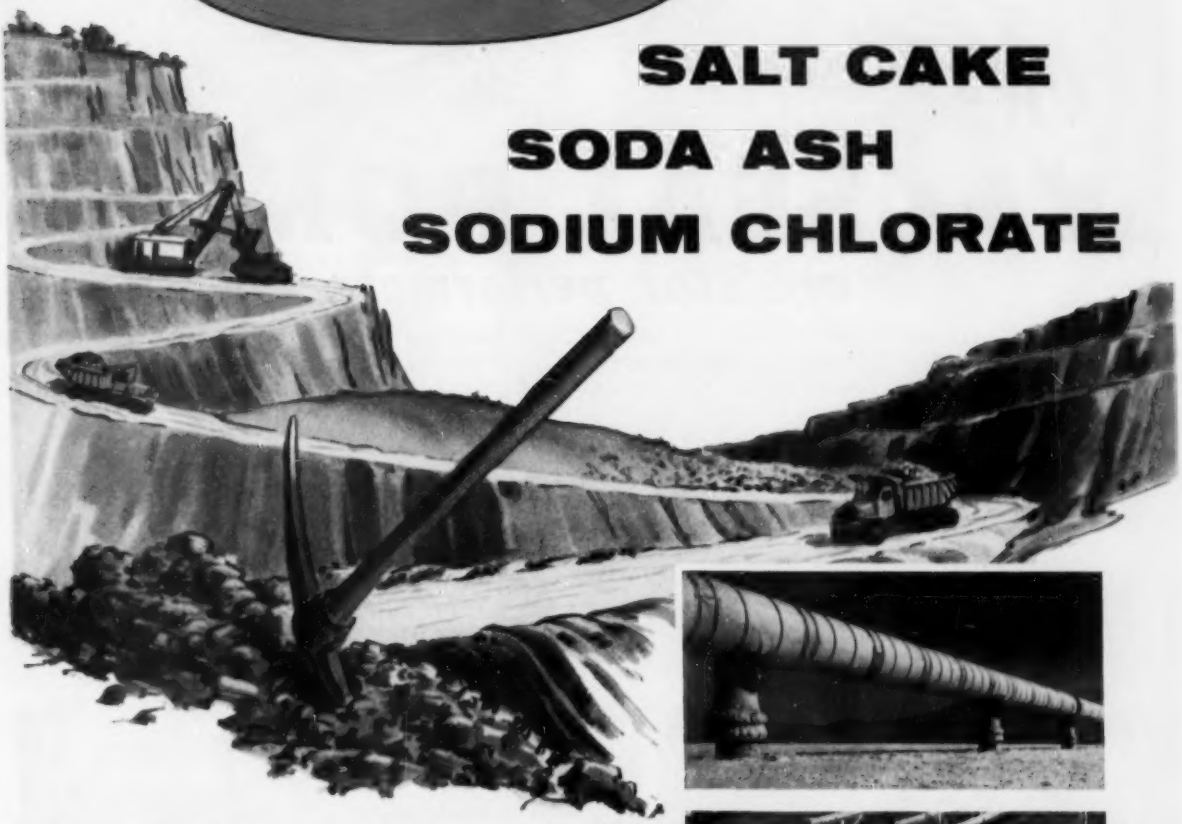
CONTINENTAL COPPER & STEEL INDUSTRIES, INC.

Sunnyvale, California



TRONA

SALT CAKE
SODA ASH
SODIUM CHLORATE



pick of the mining world

TRONA* Salt Cake, Soda Ash and Sodium Chlorate are improving ore processing everywhere – getting through to pay dirt faster, adding the mark of quality to ore concentrates. In the refining of lead dross and non-ferrous metals, TRONA Salt Cake and Soda Ash provide more effective and thorough ore treatment. In uranium and similar ore processing, TRONA Sodium Chlorate speeds oxidation, upgrades refining action. For your refining process TRONA Chemicals assure a hard working, uniform crystal that improves quality and increases mineral recovery. Make TRONA your choice for faster, more profitable processing. Ample supply and quick delivery are possible – *anywhere.*

At Trona, California (top view) high purity Soda Ash and Salt Cake are recovered from the chemical-rich brines of Searles Lake. The Henderson, Nevada, plant (bottom view) produces highest grade Sodium Chlorate by electrolytic processes.

*Trademark AP&CC

TRONA

American Potash & Chemical Corporation

LOS ANGELES • NEW YORK • ATLANTA • SAN FRANCISCO • PORTLAND (ORE.)

Producers of: Borax • Potash • Soda Ash • Salt Cake • Lithium • Bromine • Chlorates • Perchlorates • Manganese Dioxide *and a diversified line of specialized agricultural and refrigerant chemicals.*

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VACSEAL PUMPS

are star performers

In every instance tailored to fit the job, VACSEAL Pumps are serving in a wide range of industry . . . handling acids, salts, chemicals, abrasives and corrosives.

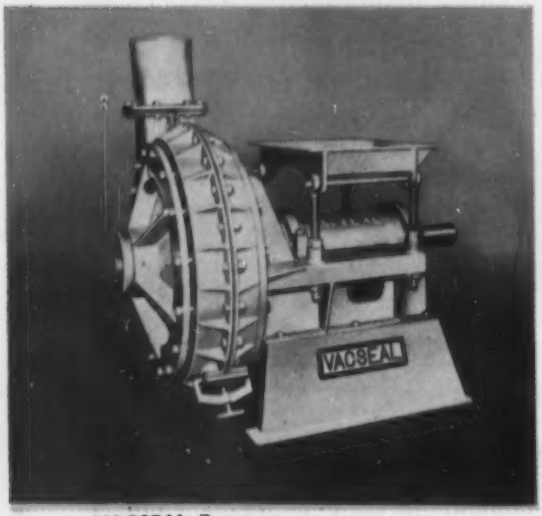
VACSEAL specifications include replaceable or fixed liners and other parts of natural or special rubber compounds, hard iron or special alloy, acid-proof or standard—all engineered for your requirements. This construction provides complete adaptability to liquids and solids pumping operations. Sizes: 1½" to 8".

Be sure to visit our display at the Mining Show. See at first hand such forward-looking engineering developments as:

1½" x 2" VACSEAL, acid-proof, Neoprene liners; 2" x 2½" standard VACSEAL with drip-proof motor; 3" x 4" VACSEAL, acid-proof, stainless steel impellers; 4" x 6" VACSEAL, acid-proof, with replaceable liners; 6" x 8" standard VACSEAL with Neoprene fixed liners; 8" x 10" VACSEAL, acid-proof, with replaceable liners and models of the Galigher Acid-proof Sump Pump.

Other features of the Galigher display are rubber-lined and rubber-covered metallurgical products and new plastic fabrications.

See it all October 1 to 4!



VACSEAL Pump
10-3600 gpm

For complete information write or see us at the

1956 MINING SHOW

Booth 301
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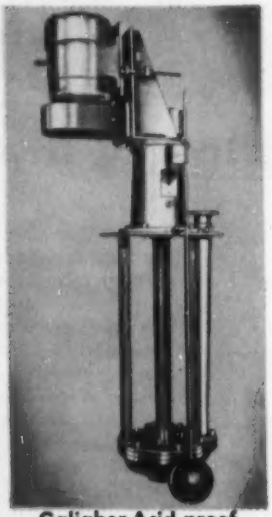

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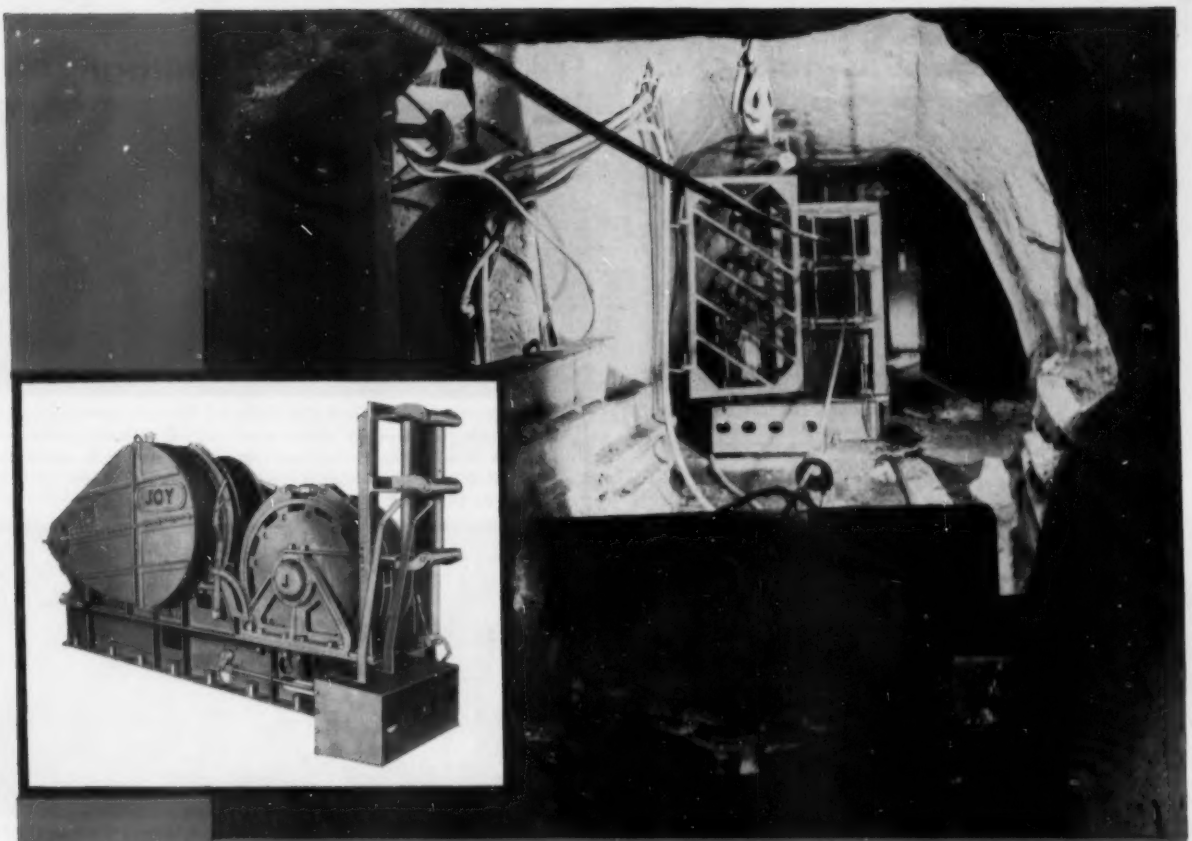
GALIGHER PRODUCTS: AGITAIR® Flotation Machine, VACSEAL Pump, Geary-Jennings Sampler, Acid-proof Sump Pump, Geary Reagent Feeder, GAL-CLONES, Laboratory AGITAIR® Flotation Machine, Laboratory Pressure Filter, Laboratory Ball Mill, Rubber Lined and Covered Products, Plastic Fabrication.



BIG JOY EQUIPMENT is the PAYOFF at CLIMAX

A mining system built around the use of high-capacity, heavy-duty scraping equipment has been the payoff at Climax. Block caving into slusher drifts, which will accommodate a 6′ folding scraper, has resulted in a saving of up to half of the cost of gravity-chute ore collection methods previously employed.

The 150 HP Joy XT-221, a large tandem two-drum slusher with chain drive, is used at Climax for this high-capacity slusher operation. Many of these heavy-duty machines work on a three-shift basis yet with remarkably low maintenance. During the loading of the first 3 million tons of ore from the Storke Level at Climax by 23 Joy XT-221 Slushers, *the only repair charge was for clutch band linings.*

The Joy XT-221 is the largest model in a complete line of rugged scraping equipment expressly built for heavy underground duty. The line ranges from the 5 HP Model S-221 to 150 HP units such as the one illustrated above in a Climax drift, and includes models which will solve most scraping problems. For complete information on Joy Slushers, write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 66-8

Consult a Joy Engineer

for AIR COMPRESSORS, ROCK DRILLS, CORE DRILLS, HOISTS and SLUSHERS, MINE FANS and BLOWERS WSW M 6737-56

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

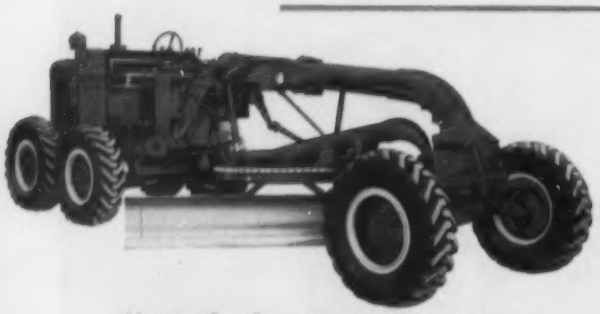
SERVING THE MINING INDUSTRY

Surface Mining

Crawler Tractors

HD-21 (Largest of 4 Allis-Chalmers models)
Torque Converter Drive
204 net engine hp, 44,000 lb

Crawler tractors with matched bulldozers handle stripping, stockpiling and many other jobs. Allis-Chalmers exclusive Box-A Main Frame does not transmit strain from dozer to engine, clutch or transmission — just one of many proven features that give long life.



Motor Graders (model Forty Five illustrated)

Three diesel-powered models up to 23,800 lb
One gasoline engine model
50 hp, 8,800 lb

Motor graders combine power and minute precision as they level pit bottoms or prepare dragline sites. Adjustable seat, power steering and pilot house visibility of this Model Forty Five help the operator work better with less effort.

Motor Scrapers

TS-260 (illustrated) 14-cu-yd capacity, heaped
TS-360 20-yd capacity, heaped
Also 5 pull-type scrapers
Capacities from 2 to 18 cu yd

For big-volume stripping, you can count on Allis-Chalmers motor scrapers to load fast, travel fast and dump clean. Special, high-apron lift prevents material from jamming. Even when loaded from overhead, anything that can be put into the bowl can be easily ejected.

Motor Wagons (TR-260 illustrated)

Rear- and bottom-dump models
Bodies interchangeable with motor scraper bodies

Large top area of this Allis-Chalmers bottom-dump motor wagon permits fast loading with less spillage. Positive hydraulic steering lets operator spot wagon quickly without tiring wheel fight. Hydraulically operated doors allow full or controlled dumping.

MODERN ALLIS-CHALMERS EQUIPMENT

Hauling and Haul Roads

Allis-Chalmers crawler tractors and pull-type scrapers are an ideal team for tough cut and fill work and short-haul stripping. Whether pushing or pulling, Allis-Chalmers torque converter drive sets new standards of tractor-scraper performance.

The low-cost Model D is a real economy leader on haul road maintenance jobs. It has tandem drive ROLL-AWAY moldboard, tubular frame and other big-grader design and performance features, yet it costs only one-third that of large machines.

The TS-260 motor scraper develops 18 hp per cu yd struck capacity. This gives you high travel speed when it counts most — traveling with a payload or working on adverse grades. Positive, controlled hydraulic steering permits fast, safe travel.

Wheel base on the TR-260 rear-dump motor wagon does not change while dumping. Thus, operator can lock air brakes on all four wheels while dumping over steep drops — an important safety advantage. Smooth interior, plus high, 70° tilt assures fast, clean dumping.

Underground Mining

The 1½-yd HD-6G excavates ore, transports it to the surface, or loads shuttle cars underground. Tractor Shovels are available for all four Allis-Chalmers tractors with buckets up to 4 cu yd. All have electric starting on diesel fuel for greater safety.

SEE US AT THE

MINING SHOW

LOS ANGELES, OCT. 1 to 4

BOOTH Nos. 737-733-729-725-836-832-828-824

Keeping Step with Stepped-Up Demands

In the past 15 or 20 years, the mining industry has kept production costs down in spite of rising labor and material costs. To do it, mine operators have pioneered new methods that put constantly increasing demands on machinery.

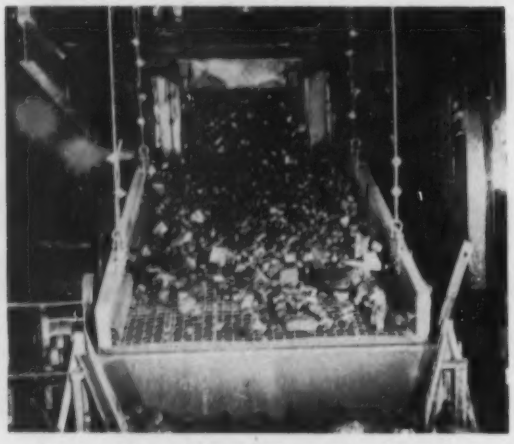
Through the years, Allis-Chalmers has kept pace with these conditions by gearing its equipment development to the mine operator's needs. Here is just a small sample of this modern equipment at work. For further information write Allis-Chalmers — producer of the most complete line of major mining tools.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

ROLL-AWAY is an Allis-Chalmers trademark.

GYROSET VIBRATING SCREENS FOR SIZING AND DEWATERING MEAN TOP PRODUCTION AND GREATER EFFICIENCY



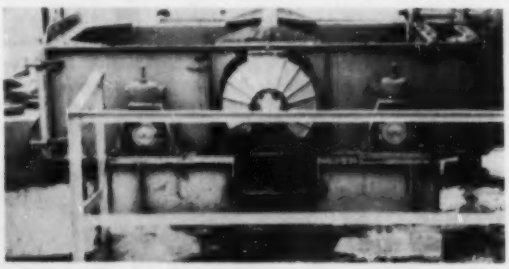
POSITIVE ECCENTRIC ACTION
POSITIVE STROKE ADJUSTMENT
with only 2 bearings

The positive eccentric action of GYROSET Screens gives a full circle throw over the entire length and breadth of the screen surface. With a two-bearing action, movement is achieved with the fewest moving parts.

Experienced mining operators install GYROSET Screens to insure top sizing performance at a minimum cost.

GYROSET Screens can effectively scalp, size or de-water. Due to their adjustable action and their ability to operate at high speed and with any degree of pitch GYROSET Screens will work at a higher capacity than any other screening unit. With positive action GYROSETS can handle dry or wet sizing of ores in a wide variety of sizes at maximum capacity and efficiency.

Construction is simple and rugged. One to Three decks. 18″ to 72″ in width—4′ to 16′ in length. Dust tight units available.



SEE US IN BOOTH 544 AT THE LOS ANGELES MINING SHOW

WE WILL BE GLAD TO DISCUSS YOUR SCREENING PROBLEMS WITH YOU.

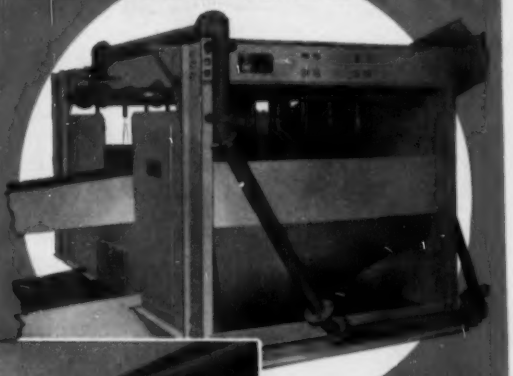
PRODUCTIVE EQUIPMENT CORP.

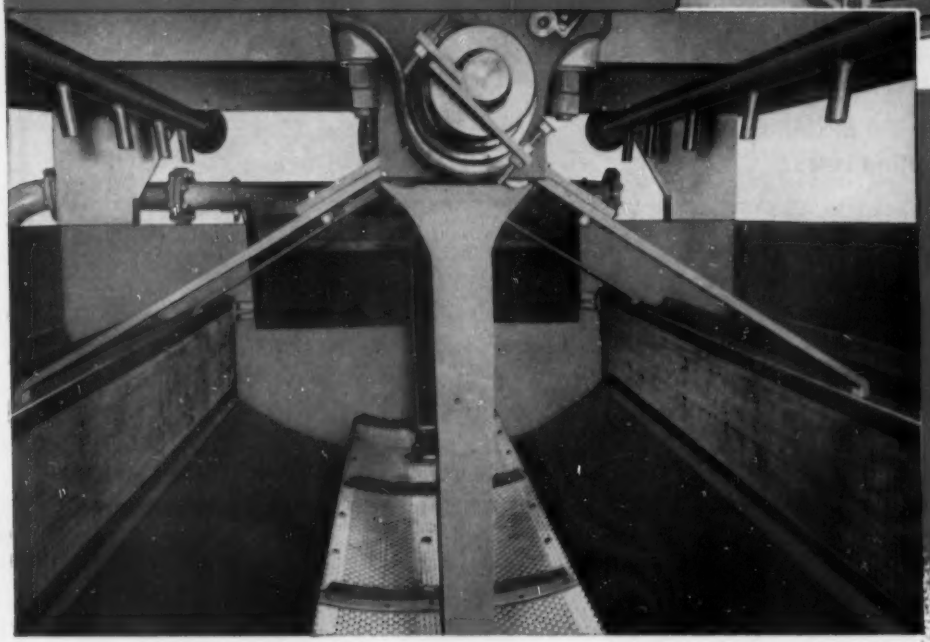
2926-28 West Lake Street **Chicago 12, Illinois**

Now...BETTER HM SEPARATION

with OCC Vessel

because of its large productive pool area





Left, view of the interior of the OCC Heavy Media Vessel, illustrating its large pool area; view is from discharge end of vessel. Above, exterior view: float and sink discharges on left and feed chute on right.

U. S. and Foreign Patents Pending

Simplicity of OCC Vessel Introduces Broad Operating Economies

Since the introduction of the Heavy Media process, the development of a separator whose simplicity would match that of the process has been an aim. This has been achieved through the design of the OCC Vessel illustrated above. The rake suspended in the center oscillates the width of the vessel. In so doing, it maintains in productive use practically the entire volume of the vessel, in contrast to other separators employing only a fraction of same. The result is improved metallurgy and increased economy.

The remarkable simplicity of the vessel is pointed up by the fact that the rake, the only moving part in the vessel, performs not only the function of removing the sink but also that of keeping the medium in suspension. Let us send you details of how the OCC vessel can increase your operating profits, and reduce maintenance costs in an HMS plant.

See Working Model at Booth 401 Los Angeles Mining Show

THE ORE & CHEMICAL CORPORATION

Division: Mining & Milling Machinery • 80 BROAD ST., NEW YORK 4, N. Y.

INTRODUCING *the latest addition to the famous line of Timken carbide insert and multi-use bits:*

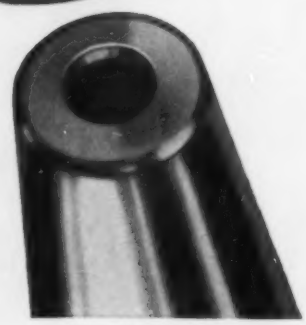
New Timken® tapered

It's removable—

Lets you get full life out of drill steel —lowers reconditioning costs

It remains secure—

Precision tapered socket gives a secure union between bit and steel



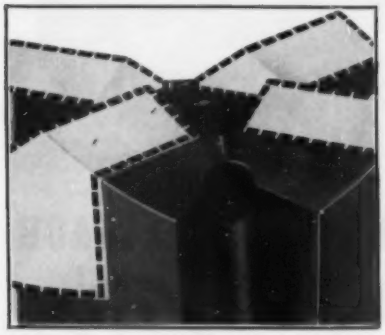
For the first time in the United States, the Timken Company introduces a rock bit for air-leg drills and light stoping with all the many advantages of removable bits, all the advantages of carbide insert bits, and specially designed frontal features to cut your drilling costs per foot of hole. Plus a consistently uniform *tapered socket* that assures a secure union between bit and drill steel, reduces breakage, and detaches quickly and easily!

With the new Timken® removable tapered socket bit you'll get full life from your drill steel, cut your reconditioning costs, and you can change bits faster. And like other Timken carbide insert bits, the Timken tapered bit will hold its gauge longer, drill faster, cut your bit costs on really tough drilling jobs. Special analysis carbides give the Timken tapered bit superior wear-resistance, with added shock-resistance. Adds life to the bit. Other new mechanical features—specifically made to cut drilling costs on air-leg drills and light stoping—include five specially positioned front blowing and washing holes, and new extra clearance between wings for speedier chip removal.

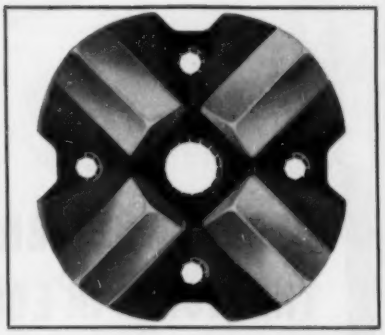
This new Timken tapered bit can be reconditioned many times. And the body is made of special analysis Timken electric furnace fine alloy steel—with the finest physical properties obtainable in a rock bit today. For more details, get your free Timken tapered bit brochure! Write to: The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

See us at the 1956 MINING SHOW Oct. 1-4, Shrine Exposition Hall, Los Angeles, Cal., BOOTH 635.

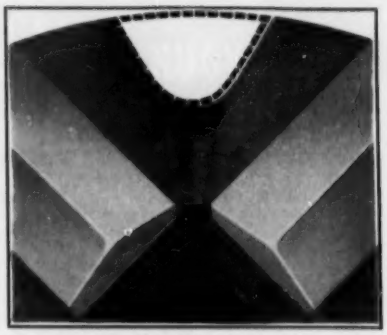
socket bit FOR AIR-LEG DRILLS AND LIGHT STOPING



LONGER BIT LIFE FROM WEAR-RESISTANT CARBIDES: Special analysis long-life carbide inserts give the 4-point "cross" cutting face superior wear-resistance, with added shock resistance. This new cutting edge adds service life to your bit, *lowers your cost per foot-of-hole.*



JET ACTION FROM 5 FRONT HOLES SPEEDS DRILLING: Positioned to direct water against face with more velocity, wash away chips faster. Larger center hole, with plug dropped deeper for freer cutting action, less drag on bit. New frontal design adds life to bit, *cuts your cost per foot-of-hole.*



FASTER CHIP REMOVAL WITH DEEPER, WIDER CLEARANCE: Extra deep, wide clearance, works in conjunction with five front holes to speedily remove chips from the cutting face. Speeds drilling, makes cutting more efficient, adds life to bit, *helps to lower your cost per foot-of-hole.*

Improved Timken Threaded Carbide Bit

for all your other tough drilling jobs

An improved version of the famous Timken threaded carbide bit! Offering deeper, wider clearance between wings—and special analysis carbide inserts for superior wear-resistance—this new Timken threaded bit offers two additional features: new, *deeper undercut* under the heel, and a new, improved thread contact! The deeper undercut adds life to your bit by improving extra clearance for washed-back chips and abrading particles—and reduces drag on the bit during drilling. A new redesigned heavier wing also contributes to faster drilling and longer bit life. By adding service life to your bit these newly designed features *lower your drilling cost per foot-of-hole.* For more details, write for your free copy of our newest brochure on Timken Threaded Removable Rock Bits.

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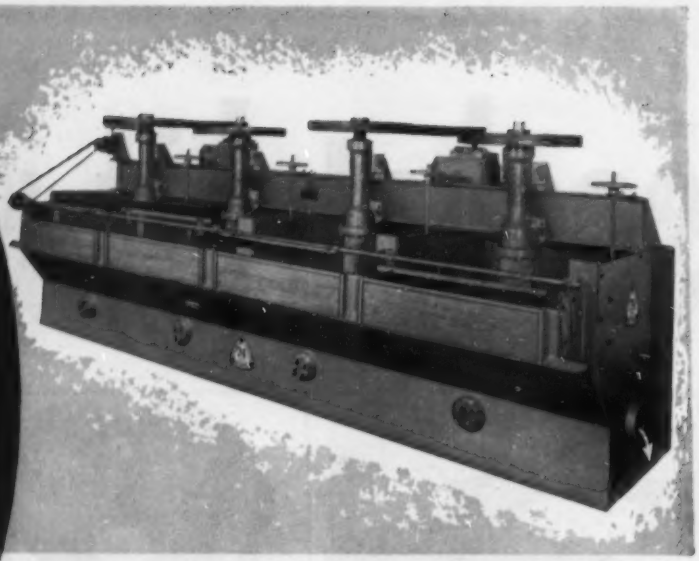
TRADE-MARK REG. IN CANADA AND U. S. PAT. OFF.

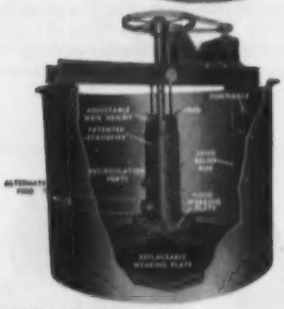
Your best bet for the best bit for every job . . . threaded carbide insert, multi-use tapered carbide insert

DENVER CAN SUPPLY COMPLETE EQUIPMENT FOR YOUR MILL

One Responsibility

Crushers, Screens, Feeders, Ball-Rod Mills, Classifiers, Jigs, Pumps, Samplers, Agitators, Conditioners, Flotation, Thickeners, Filters, Dryers, Ore Testing and Mill Design Services.





DENVER (patented) SUPER-AGITATOR AND CONDITIONER

- Patented standpipe gives controlled recirculation.
- All feed passes through propeller zone for complete conditioning . . . no short circuiting.
- Recirculation prevents build-up of froth on surface.
- No sanding in of propeller on shutdown.
- Sizes 3' x 3' to 20' x 20'.

For complete information, WRITE FOR BULLETIN NO. A2-B4.

HERE'S WHY DENVER "SUB-A" LEADS THE WORLD IN ECONOMIC METALLURGY

FLOTATION EFFICIENCY cannot be based on any single feature. Low tailings, clean concentrates, low horsepower, long part life, continuous operation, coarse feed, initial and operating costs and space required must be balanced to produce the greatest NET PROFIT FOR YOU.

Deco's "know-how" in flotation engineering is unequaled. The Denver "Sub-A" can be adapted to meet milling conditions instead of adapting your plant to meet limitations of the machine. These features of mechanical flexibility which your mill man needs to gain ECONOMIC METALLURGY are illustrated in Deco Bulletin F10-B81—sent on request.

Case histories of Denver "Sub-A" flotation in problems similar to yours will be sent on request. Flotation tests and flow sheet design services are available. Consultation is without obligation. Write today. Use our experience to help increase your PROFITS BY FLOTATION THE MODERN WAY.

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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

September 1956

INTERNATIONAL PANORAMA

SANGI, CEBU, REPUBLIC PHILIPPINES—Atlas Consolidated Mining and Development Corporation will build a roast-leach-electrolytic copper refining plant here to treat concentrate from Atlas and other Philippine mines. Also by-product pyrite concentrate will be used for sulphuric acid and fertilizer manufacture.

THE DALLES, OREGON—Harvey Machine Company, Inc. will build a $65,000,000 primary aluminum plant here with an annual capacity of 54,000 tons. Alumina will be imported from Japan for refining.

MONTICELLO, UTAH—Texas Zinc Minerals Corporation, joint subsidiary of the Texas Company and New Jersey Zinc Company has bought the Happy Jack uranium mine from Bronson and Copper Mining Company. Texas Zinc has an AEC contract for a new uranium mill at Mexican Hat, Utah to process the ore.

SELMA, ALABAMA—A new 10,000 ton annual "high purity" magnesium plant using dolomite as the mineral source will be built here by Alabama Metallurgical Corporation.

TONOPAH, NEVADA—The Anaconda Company has taken a lease and option on the Hall molybdenum mine north of here. Diamond drilling and mapping are underway.

GRANTS, NEW MEXICO—A new uranium company, Kermac Nuclear Fuels Corporation has been formed by Kerr-McGee Oil Industries, Inc.; Pacific Uranium Mines Company; and Anderson Development Corporation to mine Ambrosia Lake ore of the three and to build and operate a new uranium mill.

LA CONRE TOWNSHIP, QUEBEC, CANADA—The Molybdenite Corporation of Canada, Ltd. will build a 600 ton per day flotation mill at the molybdenum-bismuth mine of Preissac Molybdenite Mines, Ltd.

BELGRADE, YUGOSLAVIA—New flotation machines at the Bor copper mine have raised daily tonnage from 4,000 to 7,000. The company is also developing a promising ore body at Crni vrh 25 kilometers north of Bor.

RANGOON, BURMA—A joint venture company is to be formed by Anglo-Burma Tin Co., Ltd. and the Government of Burma for rehabilitation and mechanization of Anglo's tin mine.

SAN FRANCISCO, CALIFORNIA—United States production of aluminum in the first six months of this year reached an all time half year high of 860,304 tons.

TORONTO, CANADA—A record uranium contract for purchase of $242,416,800 worth of uranium concentrates has been agreed to between Northspan Uranium Mines, Ltd. and the Canadian government. Northspan will treat 9,000 tons of ore daily in the Lake Nordic, Spanish American, and Panel mills to produce the contracted concentrate.

SAN FRANCISCO, CALIFORNIA—The United States Atomic Energy Commission has disclosed that the United States is now the world's largest uranium ore producer. Yearly output approaches 3,000,000 tons and potential reserves are 30,000,000.

AVOCA, IRELAND—Irish Copper Mines Limited has started construction of a 4,000 ton per day copper flotation mill here. Four ore bodies averaging 1.13 percent copper will be mined.

STEEP ROCK LAKE, ONTARIO—Inland Steel Company's subsidiary, Caland Ore Company, has started sinking a five-compartment, 1,300-foot-deep shaft here. The shaft will be equipped to hoist 1,500,000 annual tons of iron ore.

CLEVELAND, OHIO—Kennecott Copper Corporation is building a zirconium metal plant here. The new electrolytic plant will be operated under a license from Horizons Titanium Corporation.

Claims Court Again Rules For L-208 Gold Damages

The Federal government's motion for a new trial in the WPB L-208 Gold Claim Cases was denied by the United States Court of Claims on July 12, 1956. See April 1956 issue of MINING WORLD, page 56 for full details of the Court's findings.

The government has 90 days after the denial to petition the United States Supreme Court for a Writ of Certiorari from the Court of Claims, and it is possible that a further extension might be asked. However, informed Washington attorneys are of the opinion that a possibility exists (late in July) that the Department of Justice will not ask for the Writ of Certiorari, but will agree to proceed to the determination of the measure of damages.

It is a foregone conclusion that the Commissioners of the Court of Claims designated to take testimony on the question of damages are going to be very strict in their requirements of proof.

In denying the motion for the new trial brought by the government the Court of Claims handed down a lengthy opinion. Usually a simple Court Order disposes of such motions. The concluding paragraph of the opinion was "In view of the fact that the defendant's (government) allegations of error are based on a demonstrably mistaken understanding of the court's opinion and upon conclusions clearly not warranted by that opinion, inasmuch as the Court did not hold that L-208 was an invalid order and did not hold that the WPB purported to act under or invoke the requisitioning powers contained in any particular statute, defendant's motion for a new trial is overruled."

Continental Uranium Buys Crooks Gap U_3O_8 Mine

Continental Uranium, Inc. has purchased the Crooks Gap mine in Fremont County, Wyoming from the Gaddis Mining Company for an estimated $3,250,000. Announcement of the purchase was made by Gerald Gidwitz, chairman of the board, who said the exact price would be determined following verification of the mine's uranium ore potential by Continental.

Gaddis engineers have estimated the gross value of the uranium ore presently blocked out at $8,100,000 and the net reserves, after mining costs, at $5,000,000. If this evaluation is confirmed, the total price will be about $3,250,000, payable partly in cash and partly in Continental common stock.

Thus far, only about 30 percent of the Crooks Gap property has been explored. This is Continental's first venture into the Wyoming area.

In October – How Anaconda Mills Sandstone Uranium Ore

BEFORE RARE METALS, this was all desert; now it's the latest Atomic Age industrial complex. Thus, uranium has transformed the desert and nearby Navajo village of Tuba City, Arizona. Ore is dumped in bin at far right; is crushed, stored in bins, and conveyed to mill. Laboratory and power plant are left of bins. Note mill's dark Plexolite windows.

How Rare Metals' New Mill Recovers U_3O_8 From Arizona's Painted Desert

By GEORGE O. ARGALL, JR., Editor

On the fabled Painted Desert of northeastern Arizona, the Atomic Age has overtaken and engulfed the Stone Age.

Uranium is the catalyst, with Rare Metals Corporation of America supplying engineers, know-how, and money for the compression of centuries of time into a few months.

It's hard to believe, even when you have seen it with your own eyes. Almost in the shadows of the long abandoned Stone Age cities of Canyon du Chele, Dennehotso, and Kaibito, you pass yesterday's pre-atomic adobe and rock cities of Moenkoepi and Tuba and come to the Atomic Age's newest uranium mill. This multi-million dollar mill and employees village are built on the Navajo Indian Reservation with today's Atomic Age materials: stainless steel, neoprene, concrete, plastics, ceramics, electronics, and air conditioning.

Tourists have long flocked to the area to see the multi-layered beds of every hued purple and red rocks. Yesterday, prospectors and geologists Geiger-counted, drilled, and mapped these very rocks because they contained uranium. Today, it's the engineers

and metallurgists who flock to Tuba to see and inspect this newest and well engineered small uranium mill.

While the mill is small tonnagewise (designed capacity of 260 tons per day) compared to earlier mills built in New Mexico, Utah, and Colorado, the accomplishments necessary for its existence are not small by any standard.

Its very location, partially dictated by requirement of treating ores on the Navajo Reservation, and the desire of the United States Atomic Energy Commission that it be centrally located for present and future producers, made erection costly. To June 1, about $3,750,000 was spent.

In July 1955 when construction started, the nearest railroad and electric power sources were at Flagstaff, Arizona, 80 miles south.

There was no dependable and adequate source of water. No housing was available.

Fortunately, and most importantly, Rare Metals had an adequate supply of ore because it had purchased Arrowhead Uranium Company in July 1954 and since that date had been actively exploring and developing mining permits and claims on the Navajo Reservation along the Little Colorado River near Cameron, Arizona 25 miles south of the mill site. With 270,765 tons of proven ore reserves averaging 0.33 percent U_3O_8 developed by December 31, 1955, adequate mill feed was well assured before the mill started operations on June 4. This ore can all be mined by relatively low-cost open pitting.

Rare Metals vice president and assistant general manager, M. H. Kline, and southwest division superintendent, A. A. McKinney, commissioned Stearns-Roger Manufacturing Company of Denver, Colorado to do the engineering design in collaboration with the engineering department of Rare Metal's. Paul Kayser is president of both Rare Metals and the parent company, El Paso Natural Gas Company, and C. L. Perkins is the executive vice president and general manager for both firms. Construction was carried out, on schedule, by long-experienced, desert-toughened El Paso crews.

Here's how the problems and isolation have been licked. A modern village of 16 air-conditioned houses has been built at the mill site for key staff employees. A trailer court village has also been established. Electricity is transmitted 80 miles over a new high tension line from Flagstaff. An emergency power plant built at the mill uses propane gas for fuel in Climax engines driving 200-kw generators.

Today's Metallurgist Must Add These Terms To His Vocabulary

ADSORPTION—Uranium removal from solution by ion exchange or resin adsorption

BANKS—Rubber-lined, rectangular-shaped steel tanks with baffles in which a series of baskets containing resin are alternately raised and lowered through the pregnant uranium charge. Banks are also considered as a measure of unit capacity in the mill circuit.

BASKETS—Cubical-shaped stainless-steel-framed containers, covered with stainless screen cloth on four sides and the bottom, which are alternately raised and lowered in the banks. Each basket contains a predetermined volume of resin. Screen openings are large enough to facilitate free pulp interflow, but small enough to prevent passage and loss of resin beads from basket to banks.

BEADS—Carefully sized resin spheres, usually 99 percent plus-20-mesh, which have uranium loading capacity. See resin below.

ELUANT—Solution used for elution; that is, carefully controlled solution for removing uranium ions from loaded resin. Acidified ammonium nitrate is used because acidified chloride solutions would excessively corrode stainless steel baskets.

ELUATE—Uranium rich, pregnant solution, eluted from loaded resins. It is an acid solution from which final high grade concentrate is precipitated by neutralization. The eluate is much smaller in volume and much lower in impurities than leach solution. Its uranium concentration is several times greater.

ELUTION—Removing of uranium from loaded resins with acidified nitrate, (sodium, magnesium, or ammonium) solutions. The reverse of loading (see equation below). Reaction is from right to left in the loading equation. Other elution solution is common salt solution acidified with sulphuric acid.

EMF—Degree of oxidation or reduction in a solution. Controlled for best uranium exchange while suppressing exchange of other metallic anions.

EXHAUSTION—Removal of uranium from solution by resin adsorption.

ION EXCHANGE (IX)—Reaction between a solid and an aqueous solution in which ions from the solution displace similarly charged ions from the solid.

Ion exchange proves excellent selectivity for extraction of soluble uranium from leach liquors (solutions, slurries) to produce high-grade concentrate with a very high percent recovery. Recovery order is 99 percent plus of the dissolved U_3O_8 in a 70 percent plus concentrate containing no deleterious interfering elements. Mechanical maintenance is considered as low for process.

LOADING—Adsorption of uranium ions from solution by resins. Typical equation:

$$4\ \text{Resin}\begin{matrix}\text{Cl}\\ \text{NH}_4\end{matrix} + \left[\text{UO}_2(\text{SO}_4)_3\right]^{-4} \rightleftarrows \text{Resin}_4\,\text{UO}_2(\text{SO}_4)_3 + \begin{matrix}4\text{Cl}^-\\ 4\text{NH}_4^+\end{matrix}$$

LOADING FACTOR—Pounds of U_3O_8 which can be loaded on a cubic foot of new, or regenerated, resin.

NEUTRALIZATION—Adjustment to a pH of 7.0 of the uranium rich, pregnant, eluate to completely precipitate all uranium. Magnesia, MgO, is often used because it can be made chemically free of penalized trace elements. Because of its slow reaction rate magnesia often produces a large precipitate floc which is easily filterable and washable. Ammonia or caustic soda are also used for neutralization and precipitation.
Chemistry of neutralization and precipitation:

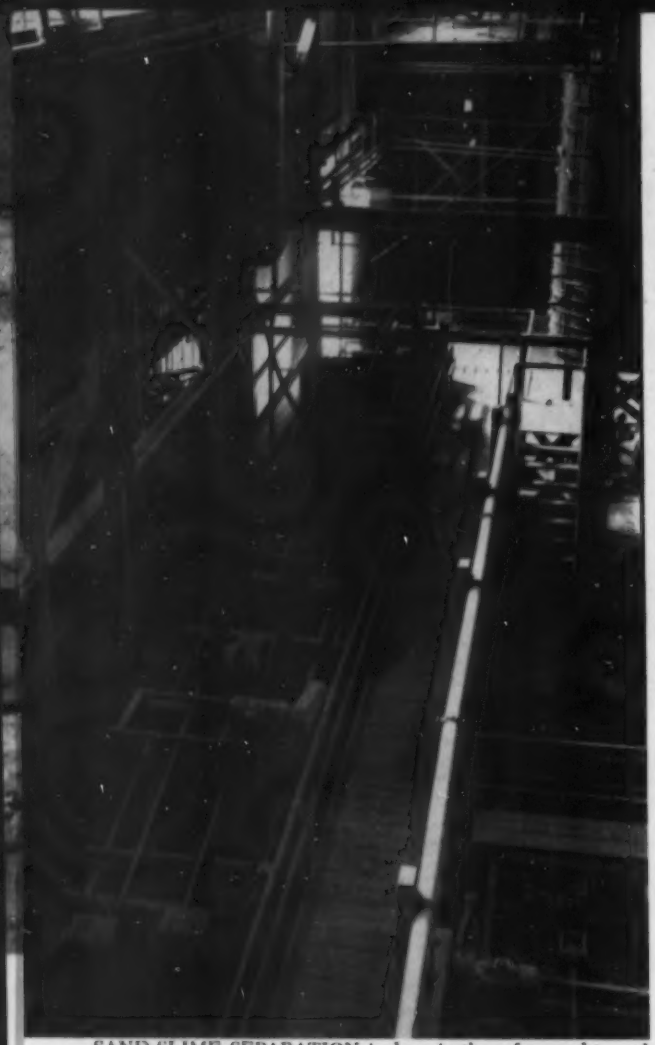
$$\text{MgO} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O}$$

$$3\ \text{MgO}\ 2\text{UO}_2\ \text{SO}_4 \rightarrow \text{MgU}_2\text{O}_7 + \text{MgSO}_4$$

$$\text{MgO} + \text{UO}_2\ \text{SO}_4 + \text{H}_2\text{O} \rightarrow \text{UO}_4(\text{OH})_2 + \text{MgSO}_4$$

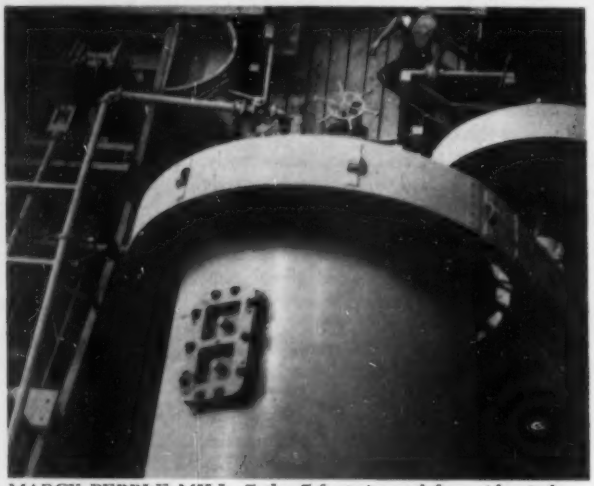
POISONING—Loading of molybdenum, zirconium, titanium, vanadium, silica, cobalticyanide, and polythionate sulphur compounds on the resin sites

Continued on page 128 (WM90)



SAND-SLIME SEPARATION is done in these four end-to-end Dorr-Oliver rake classifiers with final, minus-325-mesh, separation being made in cyclones at upper left.

BASKETS OSCILATE IN BANKS in the RIP section. Stainless steel basket shows plainly at lower right. The oil well type basket crosshead drive was designed by Rare Metals engineers.



MARCY PEBBLE MILL, 7- by 7-foot, is used for acid grinding. It is ceramic lined and a mixed charge of 2, 1, and ¾-inch diameter Coors ceramic pebbles is used for grinding.

Propane also fires the process steam (70 pound) boiler.

Water has been developed by drilling four 12-inch wells 700 to 800 feet deep just north of the mill. Electric driven deep well pumps operate alternately to supply good mill and camp water. A laboratory and metallurgical test building, an office, warehouse, and carpenter and machine shops have also been completed. There was no easy way to get all the equipment, supplies, building material etc. to Tuba. Every pound was trucked in from the rail head at Flagstaff.

Building Key Staff

Staffing the mill was well planned too. Uranium metallurgists are rare, particularly those with operating experience in the new field of RIP. Rare Metals took two methods to assure trained personnel. One was to hire experienced men, the second was to train men. John G. Roeschlaub, 1942 graduate of the Colorado School of Mines, was hired as mill superintendent. He was one of the first men hired for the AEC Grand Junction, Colorado pilot plant.

Rare Metals turned to its parent company—El Paso Gas—for men to train and selected 10-year veteran Felipe Paredes, Jr. as plant metallurgist. He is a graduate of Texas College of Mines and worked for ASARCO before joining El Paso. He combined metallurgical experience with mechanical design and had experience with corrosion problems. He spent a year learning about uranium metallurgy—both from books and reports and actual operation at AEC's Monticello, Utah mill. Allen Peck, metallurgist for Rare Metals Murray, Utah research laboratory, is one of the new crop of graduates. He specialized in flocculation and adsorption at the University of Utah. Early in 1955 AEC pilot plant testing at Grand Junction, Colorado of 319.7 tons of Rare Metals' ores from Arrowhead mines proved that the RIP process was applicable to such ores to yield a high-grade concentrate with a high recovery.

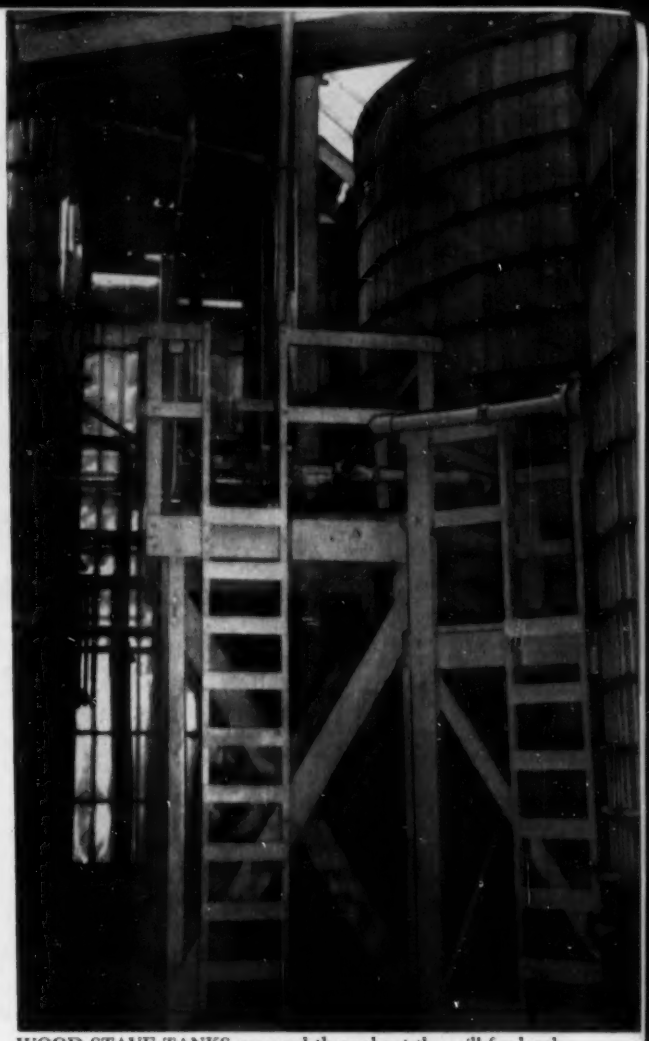
First the Sampling Plant

Construction was scheduled so that the crushing and sampling plant were completed first. In late January 1956 the plant was finished and the AEC began to sample, buy, and stockpile ore mined and delivered by Rare Metals and other companies. On June 25 when Rare Metals took over operation of the ore buying functions, more than 35,000 tons of ore had been purchased and stockpiled for milling.

All ore is delivered by truck and weighed over a 60-ton Fairbanks Morse scale. Where more than one truck comprises a lot, trucks are dumped onto a concrete receiving pad. When a lot has been completed, ore is grizzled through 10- by 17-inch openings into a 10-ton surge bin. A Syntron vibrating feeder draws off this ore to a 36-inch belt under an electronic metal detector. Minus-2-inch ore from sloping bar grizzly is

PLASTIC PIPE is used for all pulp and solution circuits in the RIP section. Here are details of several jointing methods and one way in which the pipe is supported.

AGITATION LEACHING is done in these tanks. Picture was taken from RIP section. Grinding-classification units are behind tanks. Cyclones are silhouetted on balcony above tanks.



WOOD STAVE TANKS are used throughout the mill for leaching and precipitation. Tanks at right are for precipitation. RIP section is to left on elevated platforms for gravity flow.

belted to a Tyrock vibrating screen with 1-inch openings. Grizzly oversize falls to an 18- by 36-inch Universal jaw crusher. Screen undersize goes to an open circuit, 3-foot, Symons standard crusher set for a ¾-inch discharge. Crushed ore is then conveyed to the top of six 250-ton cylindrical steel bins with conical bottoms. Ore can be dropped into any of the bins according to grade and metallurgical characteristics. One bin is equipped for truck loading and is used for ore to be stockpiled for future treatment. Each bin has a bottom draw-off cross belt feeder to regulate ore flow, as desired, from any combination of bins. These cross belts feed the main mill conveyor which runs longitudinally along the row of bins. Proportioned ore delivered to this belt is mill feed and is weighed and sampled. Ore from this belt drops directly into the pebble mill scoop box, or to a cross belt which delivers it to the rod mill scoop box.

The grinding circuit at Rare Metals is doubly flexible—either rod or pebble mill by grinding type; either water or acid solution depending on ore characteristics. However, acid grinding must be in the ceramic lined 7- by 7-foot Marcy mill. Coors ceramic pebbles (mixed load of 2-, 1-, and ¾-inch-diameter round porcelain balls) are used. Sulphuric acid is added at the scoop box. Mill overflow can be sent direct to an acid-proof, Dorr-Oliver, rake classifier or to the first (grinding circuit) agitation tank. This tank is equipped with steam coils because laboratory testing showed the value of elevated temperature leaching. However, there is some hope that in actual mill operations steam requirements will be less than laboratory indications. Pulp from agitation is cycled as primary classifier feed. Classifier sand is either returned to mill for regrind or to sand-slime classifier (washing) circuit described below. Primary classifier overflow is pumped to the leaching circuit.

A 5- by 10-foot Marcy rod mill and Dorr-Oliver rake classifier form the in-water grinding circuit. Classifier overflow is pumped to a thickener outside the mill building which, in effect, is the storage tank ahead of leaching. Classifier sand is recirculated for regrind.

Series Agitation Leach

Leaching is done in five wood (Fir) stave tanks; in fact, all mill process tanks are Fir. With the low acid strengths and continuous maintenance of high pulp levels, no trouble is expected from tank charring so a long tank life is anticipated. The wooden tanks, of course, are much cheaper than a stainless steel or neoprene lined steel tank of the same size. Two of the tanks are 14 by 14 feet and are equipped with Dorr high lift agitators. The three 10-foot-diameter by 16-foot-high tanks have Lightnin type propellers for agitation.

Leach feed is to No. 1 tank which is a preheat tank equipped with internal stainless steel steam coils. Sul-

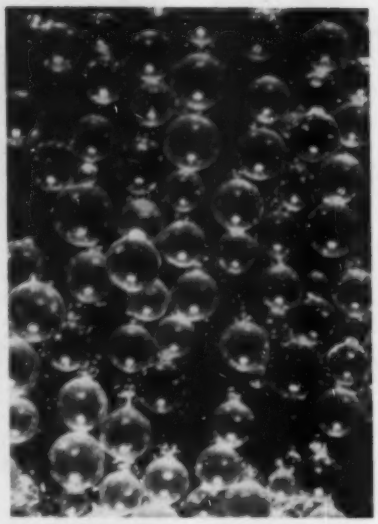
phuric acid is stage-added at Nos. 1, 2, and 4 tanks. Manganese dioxide for oxidation of primary minerals can be added as necessary by Syntron feeders ahead of the grinding mills or to the leach tanks. Ores treated from near-surface mines to date have not required appreciable manganese dioxide, however. Leach feed has a pH of 0.3; leached pulp a pH of 1.0 at 180° F. temperature, and a 45 percent density after a 10-hour leaching period.

Separation of the uranium rich, pregnant leach, pulp from the coarse barren silica sand is done with four end-to-end Dorr rake acid proofed classifiers. Sand from the No. 4 classifier is pumped to a tailing basin by a 2-inch Wilfley sand pump. Discharge from No. 5 leach tank is to No. 1 classifier. Sands advance to tailing, while the No. 1 classifier overflow is pumped to a five-inch Dorrclone. Underflow returns to No. 1 classifier. Overflow is pumped to a second cyclone. Underflow from this flows to No. 2 rake classifier; overflow is pumped to the RIP make up (correction) tank. This very thin pulp, in fact almost a solution, has a density of 1.06 and is all minus-325-mesh.

RIP Make Up

Before solution can be sent to ion exchange banks, it must be corrected to a pH of 1.6 and an EMF of 425. Therefore, it is necessary to have three separate storage tanks. These are 17-foot diameter by 20-foot-high Santa Fe tanks. At any time, one tank is being filled, a second tank is being emptied to banks, and the third is being adjusted.

Anhydrous ammonia is mixed with air and blown through the tank bottom into the solution to adjust the pH. The use of air agitates the solution for better mixing and prevents "banging" due to chemical reaction within



PERMUTITE SK plus 20 resin shown in this Permutite Company photomicrograph is used by Rare Metals for U_3O_8 recovery.

the solution. The EMF is adjusted by use of powdered iron. This reduces the vanadium to valence of plus 4 to prevent it loading on resin. After an adjusted tank has been emptied, it is switched to filling, and the third, or adjusted tank, is placed on bank feed. Bank feed is screened on flat Tyrock vibrating screen fitted with basket cloth to remove all wood, hair, etc. which might blind baskets.

Banks and Baskets

Mild agitation of solution in the banks improves circulation and prevents settling of solids in or out of the baskets. Therefore the oscillating, or dunking, of the resin in the pulp was developed. It has been found that the pumping action created within the bank by raising and lowering the basket alternately contracts and expands the bed of resin beads to further increase surface contact with the pulp. Actually the solution is fed into the bank along a slot on each side. Baskets have 2-inch fins extending from the bottom outward to almost touch the baffle so as to make pumping action stronger.

Rare Metals engineers, headed by Felipe Paredes, Jr., chief metallurgist, have perfected their own method of raising and lowering the baskets. Not surprisingly they have adapted an oil well pump drive. Each of the 14 banks has four 4- by 4- by 4-foot stainless steel baskets. Four baskets for one bank are driven by one electric motor. This drive is so arranged that drive rods are outside the bank. One drive rod can be uncoupled and by taking off only eight bolts, a unit of two baskets can be lifted right out of the bank for inspection or repairs. The actual movement of the baskets is activated by an oscillating crosshead. Another important design feature incorporates a special spring at the end of each arm through which the elevation chain is fastened. This spring cushions the pick-up-shock as the basket is changed from down to up motion.

All banks are elevated with No. 1 bank being the highest so that solution flows by gravity from top to bottom. Pumping is necessary to recirculate to the highest bank. Baskets are made of Ton Cap 147 screen fabricated with Carpenter 20 stainless steel. Wire size is eight and 28 mesh to form a cloth in which holes are all plus-35-mesh in size.

Each basket has a charge of Permutit SK, 100 percent plus-20-mesh in size. The high capacity of this resin should make possible loadings of 4.0 pounds of U_3O_8 per cubic foot. An ion exchange feed of 1.0 gram per liter is desirable; however, the loading operation is still efficient if the grade is kept at 0.5 grams per liter.

At any time eight banks are on exhaustion, one is on standby and five are on elution. In practice the lead bank on exhaustion is considered to be loaded to capacity when the effluent from that bank is equal to the ion exchange feed.

After resins are loaded, the bank is dumped into a drain tank from which solution is then pumped to the head of the circuit for recycling. The bank which has been dumped is then added to the downstream end of the elution cycle. Four volumes of elution solution to one volume of resin are used. The uranium must be completely removed from resin and must be in smallest solution volume to reduce subsequent precipitation costs. The nitrate ions in eluant replace the uranium sulphate ions on beads.

Eluate is pumped to one of three pregnant solution holding tanks.

MILL STAFF is headed by superintendent John G. Roeschlaub who was one of first men hired for the AEC's Grand Junction, Colorado pilot plant. Plant metallurgist, Felipe Paredes, Jr. (right) combines metallurgy and design experience.

Again three are used; one filling, one filtering, and one corrected and ready for precipitation. Tanks are 16 by 18 feet, wood stave, with four vertical baffles inside each. Each tank has a Lightnin type Mixing Equipment Company agitator.

When a tank has been filled, it is ready for precipitation. First the pH is brought to 7.0 by addition of anhydrous ammonium and air. Separan 2610 in a 0.5 percent solution diluted 10 to 1 is added as a flocculant.

The precipitate slurry is pumped to one of two 30-inch Eimco-Burwell filters. Filter cake is repulped and pumped to a steam heated Blaw Knox rotary drier. Pulp is sprayed on outside of heated drum where it is dried within seconds and scraped off; dried concentrate is drummed and shipped to AEC.

NAVAJO INDIANS are used for mill operators. After training they are used for most operating jobs including laboratory assistants. Note basket drive and plastic piping.

Elution Make Up

Once again three wood stave tanks are necessary. One is being filled, one is corrected for elution, and the third is elution feed. The filtrate from the Burwell filter is used for elution make up. The nitrate concentration is adjusted to 1.0 molar with HNO_3, and the pH is corrected to 1.0-1.2, if necessary, with NH_3.

To go back to banks again: The overflow from the eighth bank on exhaustion from which all uranium has been removed is the solution tailing. It is pumped to a separate but adjacent pond to which sand tailing is pumped.

Resin is poisoned by molybdenum, zirconium, titanium, vanadium, and SiO_2 from solution so that it progressively loses its ability to pick up uranium. In other words, the loading factor goes down as sites are occupied by poisoning ions. Therefore it is necessary to restore the resins periodically. This is done on a batch basis by pumping a 1.0 percent NaOH, 0.3 molar $NaNO_3$ solution into the banks. This exhausts poisons and restores nitrate ions to beads.

More About The Mill

Those are the highlights of the process and equipment. Here are the highlights of the mill and operation.

The mill is basically four, all-steel, Butler, prefabricated buildings placed side by side to form one four gabled building. However, extra steel beam legs have been welded to the bottom of each main Butler leg. This gives a 60-foot interior height at gable peaks. The mill is 140 feet wide and 270 feet long. Plexolite plastic roof panels and a continuous band of Plexolite around the top of the entire building assure outside lighting for all interior sections of the mill. Overhead floodlights do the same at night. This prefabricated building speeded construction, lowered freight costs, and lessened on-site erection costs. Space heaters provide winter heat.

The four bays contain: grinding circuit; leach tanks with room for expansion; banks; and make up tanks, filtering and drying. Over each bay a U-shaped rail is hung from the building frame. Overhead cranes travel on this so that any piece of equipment (except grinding mills) can be picked up for servicing and repairing.

Thickeners, which are outside the building, are built on a concrete slab with a concrete wall around each. Thus any spillage or leakage is caught. In the mill one extra tank has been provided. This is for emergency storage of any pulp or solution from a leaking tank, or the spare tank can be placed in normal circuit while repairs are being made to regular tank.

6,000 Feet Plastic Pipe

One of the outstanding features of mill construction is the use of plastic pipe.

It is used for all piping, excepting steam and fresh water lines, and occasional short sections where rubber hoses are used for gravity drops under no pressure.

More than 6,000 feet of plastic pipe in 6¾, 4, 3, 2, 1¼, 1, and ¾ inch sizes are used. There are thousands of plastic fittings of all kinds used to tie all this pipe together. Pressures of 60 pounds are common for many pipe sections. In places, 100-pound pressure is used. Some lines are also subject to intermittent service.

Actually three separate methods were used for joining pipes and fittings. For some lengths of larger pipe with special thick walls for high pressures, conventional threads were cut for use with threaded fittings. In general, Victaulic fittings were used where pipe-to-pipe connections were used. However, the groove cut in the pipe for the coupling is a point of weakness. The third method, and it was used primarily for fitting-to-fitting joints, was solvent cementing using a very fast setting compound; in fact, pipe crews had to learn by trial the best methods of joining pipes. Plastic pipe is not strong so it must be adequately supported, even on vertical runs. Some problems have developed due to joint leakage and rupturing of lines. Both Carlon and Uscolite piping and fittings are used.

Rare Metals has taken a characteristic bold step in using this pipe. Study the pictures, particularly of the RIP section, in detail to see how plastic has been used—probably more extensively than for any mill of comparable tonnage in the world.

Rare Metals' Second New Mill

Rare Metals continues to do big things in the mining industry—in a hurry, too. See "How Rare Metals Made Mining History at Idaho's Almaden Mercury Mine" in the December 1955 issue of MINING WORLD.

Rare Metals brings an important new outlook to the mining industry. The El Paso Gas parent is strong because it believes in the best plants, equipment, and staff. Rare Metals has adopted this proven formula. The mining and metallurgical industries will profit by this new look.

INTERIOR OF HOIST HOUSE, at top, shows two 15-foot diameter, double drum hoists for the ore hoisting shafts. Each hoist is powered by two 3,000 horsepower motors. Circular steel sets, at left, find application, but future block development will use concreted grizzly drifts, particularly in areas of heavy ground and where coarse ore requires secondary blasting.

Size of Undercut Stopes Reduced

On January 23, 1956, the first block was undercut and caved at San Manual Copper Corporation's mine 45 miles northeast of Tucson. This marked the official start of production from what will be the biggest underground mine in the United States by the year's end. Full production will be reached sometime next year and will level off at 30,000 tons per day. At that time a train carrying 180 tons of ore will cross one of the pockets at the two ore hoisting shafts every six or seven minutes.

The San Manuel project very nearly defies the imagination. Never before in the history of the nation's underground mineral industry was a mine ever planned for such a huge daily output without first expanding gradually from a smaller scale operation. The basic problems of exploring, developing, planning a mining system, equipping the mine, and training a reliable working force from supervisors to miners was a gigantic undertaking. Also the speed at which production is mounting is nothing short of remarkable.

Block Caving

At San Manuel, mining is being done by block caving using a gravity draw system through a series of transfer raises. A checkerboard pattern of stopes is used to reduce ground pressures under and adjacent to caving blocks. After undercutting, followed by an initial rapid draw to promote rock failure, the caved mass will be pulled at a rate as near 12 inches per day as the character of the resulting caved muck will permit.

At present, the panels, extending from footwall to hanging wall, are laid out on 245-foot centers along the strike of the orebody. These large initial blocks were designed to insure that the overlying overburden of conglomerate would cave. On June 16, 1956, the first stope broke through to surface with the stope about 32 percent drawn. Grizzly drifts within the panels are spaced on either 30- or 35-foot centers. Haulage cross cuts, 60 feet below the grizzly level, are on 70-foot centers and connected with the grizzly level by a system of transfer raises which hole the grizzly drifts on 17.5-foot centers. Caved ore which funnels from the undercut level to the 1475 haulage level is loaded in 15-car trains and is hauled 6,000 feet to the twin muck shafts where rotary tipples empty three cars at a time Each mine car carries a 12-ton pay-load. Traffic travels in one direction only through a haulage loop, and at a maximum speed of 12 miles per hour which is as fast as any underground operation in the west.

For Better Control

Some of the considerations which govern actual caving and drawing practices at San Manuel are summed up below. Mine planning was based on obtaining a strictly vertical draw from the caved zone rather than assuming an expanding ore column. It was decided to use a gravity draw system through transfer raises rather than slusher drifts, because it was felt that a more precise and even draw could be maintained. Also that repair costs might be somewhat higher with a slusher draw. San Manuel planners felt that an even rate of draw was the most essential factor and the system was planned to give the best possible extraction without leaving any islands of ore through channeling or turning a block.

Hook in Orebody

The very nature, shape, and atti-

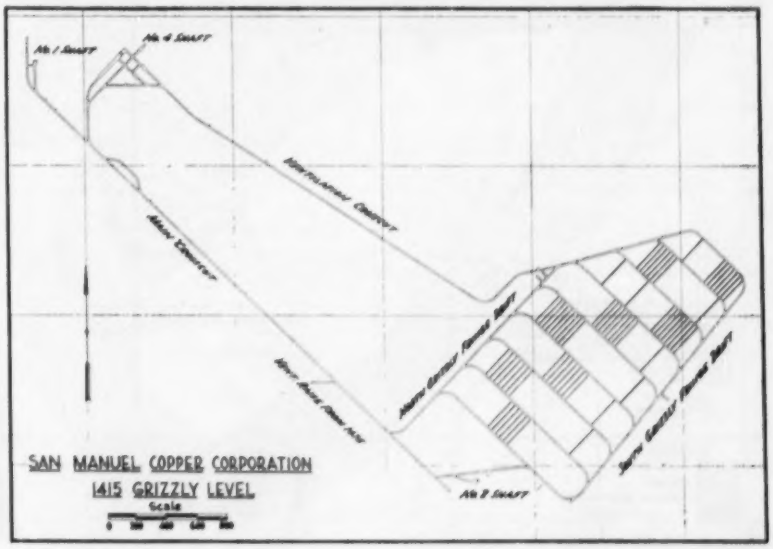
TWIN ORE HOISTING SHAFTS, at top, each have a capacity of sixty, 18.5-ton skiploads per hour. Hoisting is done semi-automatically by skip tender from the bottom of the shaft. Floating chutes, at right, were designed for transfer raises and are completely independent of ground support. Cylinder and door guides are suspended from chute slide.

As San Manuel Production Mounts

tude of the mineable limits of the ore body is one of the primary reasons why it had so long remained undeveloped. The deposit in section is shaped like a giant inverted comma or hook with a pronounced thickening near the upper, hook end of the structure. The entire mineralized zone covers an area nearly one-half mile wide and over one mile long. The strike is northeast and the dip, commencing at the upper end of the north limb, is 55° southeast. This attitude gradually flattens with depth until the hanging wall, at a point about 1,050 feet below the surface, rolls over and becomes the footwall of the southern limb. The upper portions of both limbs have been well oxidized and contain chrysocolla as the predominant mineral. It is the upper third of the sulfide portion of the southern limb which is being developed from the 1475 and 1415 levels at present.

The rock occurring in the deposit is a quartz monzonite and a finer grained monzonite porphyry containing disseminated low grade copper mineralization. Below the zone of oxidation there is an irregular belt of secondary enrichment, and in the primary zone, chalcopyrite and pyrite predominate.

The north limb of the ore body outcrops in the vicinity of Red Hill. A quarry has been opened up on Red Hill to furnish silica for fluxing requirements at the smelter located seven miles southeast of the mine. The remainder of the ore body is covered by a varying thickness of Gila conglomerate which has been thrust over the deposit by the low angle San Manuel fault. It is this peculiar combination of thrust faulting and shape of the San Manuel ore body which led to the deposit being developed as an underground mine rather than an



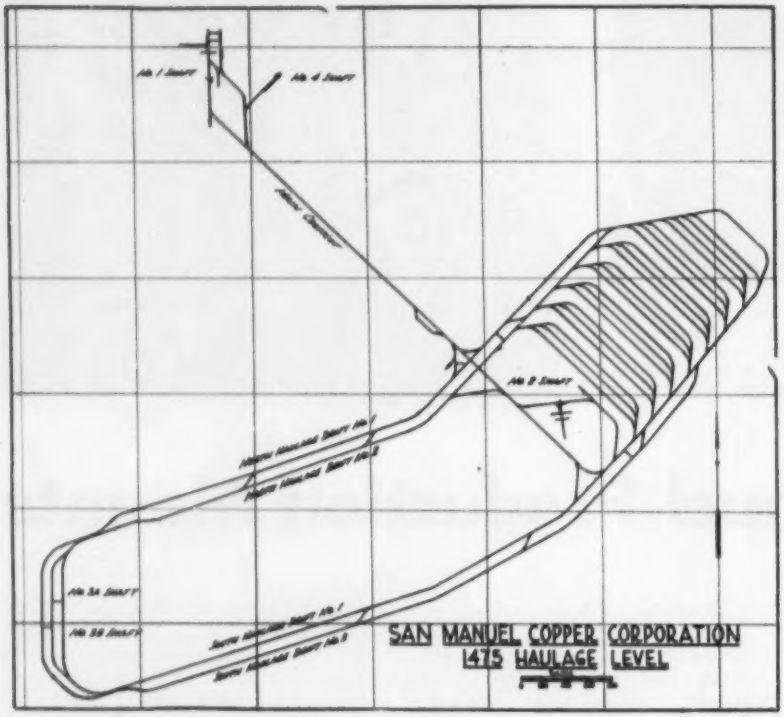
open pit.

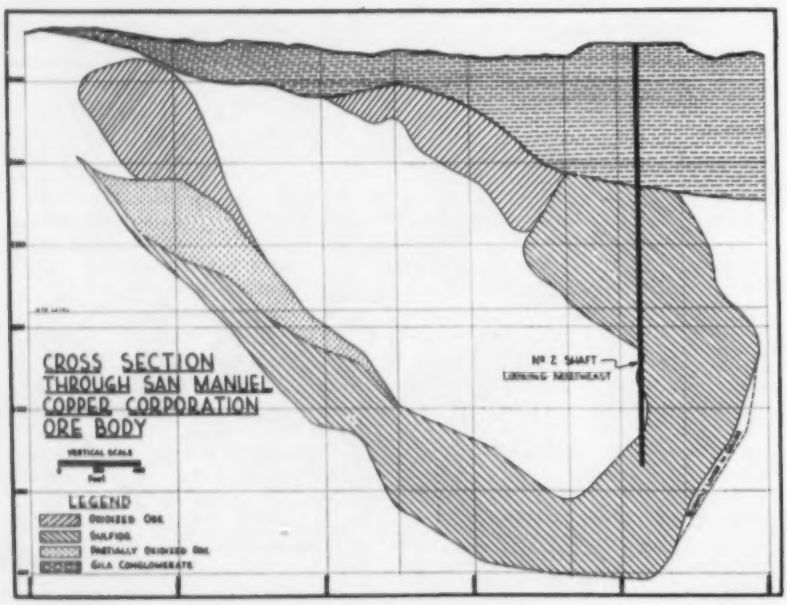
The existence of low-grade copper in the area was known many years ago and exploration had been carried out in the vicinity of the Red Hill outcrop. But it appeared that reserves were not large enough to justify development because the existence of the hook in the ore was unknown.

During the World War II years, the United States Geological Survey examined the area and the United States Bureau of Mines conducted a limited churn drilling program. Magma Copper Company obtained an option in 1944, exercised the option late in the same year and continued churn drilling exploration. It soon became apparent that a huge deposit existed and plans were made to develop and mine it. San Manuel, a Magma subsidiary, was established, and a loan was negotiated with the Reconstruction Finance Corporation. Plant construction began early in 1953 with Utah Construction Company and Stearns-Roger Manufacturing Company as prime contractors. During this time underground development was pushed and the mill and smelter were completed in late 1955. The first stope was undercut and caved late in January 1956.

Mine reserves of ores have been quoted at 367,624,000 tons of sulphide ore, averaging 0.785 percent copper and an additional 111,876,000 tons of oxide ore averaging 0.717 percent copper.

Five shafts were sunk to service, develop, and hoist ore from the San Manuel deposit. Initially, shafts Number 1 and 2 were sunk and connected in order to carry out preliminary development as well as exploration to more thoroughly delineate the ore boundaries. Two muck shafts, Number 3A and 3B, were sunk to handle the ore hoisting problem at the mine. Number 4 shaft serves as the primary servicing facility for the mine. All men and supplies are lowered through the Number 4 shaft.





Oxide Remains Undisturbed

The first haulage level was established on the 1475 level and the grizzly level is located 60 feet higher, on the 1415 level. This horizon provides an average of 500 to 600 feet of caving ground above the undercut level. The top of the ore body pitches to the east reducing the thickness of recoverable ore near the boundary, so a slusher-draw plan has been devised for panels near this fringe.

The 1415 level on the south limb served as a natural point to begin development for block caving. The depth provided sufficient backs for caving. In addition caving operations in this area will leave the oxide zones in both the south and north limbs undisturbed, and available for extraction at a future date. This was an important point from the standpoint of ore conservation. Next to be developed is the 2075 haulage and 2015 grizzly level, and work is now proceeding on these lower elevations.

175 to 270-Foot Blocks

The present stoping system has been designed to use a series of 210-foot wide panels; each panel extends across the ore body. A total of nine of these panels have been outlined by development plans to date to cover the upper portion of the ore zone. The stoping blocks in each panel will vary from 175 to 270 feet long. A 35-foot wide pillar separates adjacent panels. A panel drift is driven down the center of this pillar to service active grizzly drifts in the blocks and connects to fringe drifts driven along

each side of the ore body and outside the ore zone. Thus each panel drift is part of a loop, simplifying access and ventilation. Timbered grizzly drifts are spaced on both 30- and 35-foot centers in the panels. Grizzly drifts in panel Numbers 3 through 7 are spaced on 30-foot centers, while in panel Numbers 8, 9, and 10, a 35-foot spacing is used. Experience gained in caving to date would tend to indicate that a 30-foot spacing is more desirable. At the extreme eastern fringe where the pitch reduces the height of the ore above the grizzly level to 200 feet, two slusher blocks are planned. A slusher system requires only about one-sixth the development footage necessary for the transfer raise system now used.

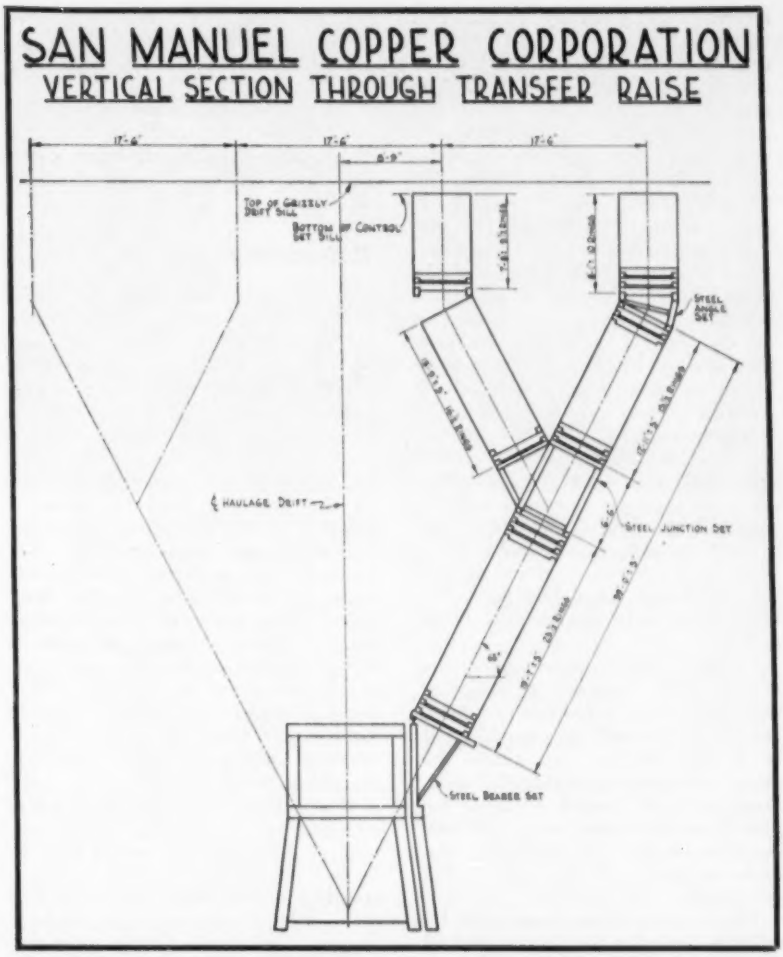
Transfer Raises

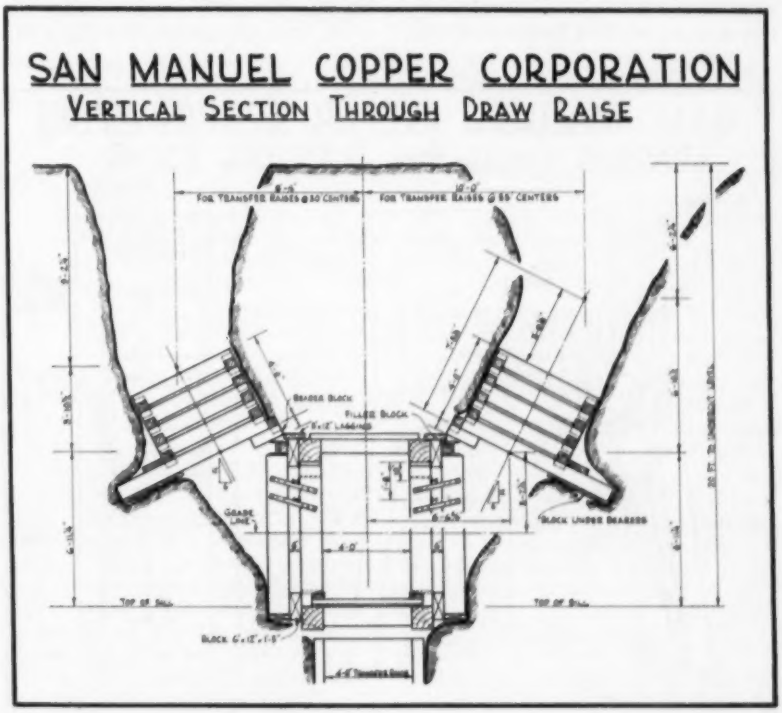
On the haulage level, for the present gravity system, three haulage crosscuts are driven 60 feet below the grizzly sill to gather the ore. They are spaced on 70-foot centers. A series of inclined transfer raises hole the grizzly drifts every 17.5 feet. Two cribbed transfer raises, inclined at 63° from horizontal are started directly opposite each other in the haulage crosscut. From each raise a backover is driven starting about 20 feet above the bearer set in the transfer raise. Thus each grizzly drift in the panel is holed by 12 transfer raises from the three haulage crosscuts. Draw raises in the grizzly drift are started in the drift wall directly opposite every transfer raise holing. Thus each transfer raise station on the main level has received ore which was funneled from eight draw raises. Each grizzly drift in a panel contains 24 draw raises, and an average stope which is eight grizzly drifts long, contains 192 draw points on the grizzly level.

Block Development

Now that the conglomerate has broken through to surface and a rift or slot has been made along the length of the ore body, the large stopes are no longer necessary. Stopes of approximately half the undercut area of the initial stopes are being developed to extend and widen the slot. With smaller stopes the sequence of mining is simplified and allows the full use of the extensive development which was necessary to bring in one stope in each panel. With smaller stopes the mining can be confined to an area east of Number 2 shaft which will be lost in future mining, but which is vital to present development work on 2015 and 2075 levels.

Grizzly drifts are driven 7 by 7





feet wide and generally are timbered. Sectional, circular steel, and yieldable arch steel sets with pole lagging are finding increasing application. The ground which is quite heavy has stood surprisingly well in some areas and repair costs have not been excessive. Forty five-pound mine rail on 12-inch spacing is used to form the grizzly on top of the transfer raises.

Future block development will use concrete grizzly drifts, particularly in areas where the ground is exceptionally heavy and the ore is coarse, requiring heavy secondary blasting. One slusher block and two gravity blocks are now being developed for concrete support in rock which is sufficiently hard to allow the grizzly drifts to be driven with roof bolts and chain link fencing as the preconcrete support. Concrete will be mixed on the surface and sent underground through 8-inch pipe cased churn drill holes where it will be shot through 6-inch pipe line by pneumatic placers to the desired block areas.

Finger raises, driven from the grizzly drift, contain a timbered bearer set which is blocked to a hitch cut in the footwall on one side and to a steel H-beam cap across the draw raise opening on the other side. Four rings of framed cribbing are placed on the bearer set and the remainder of the raise is raw to the undercut level, 25 feet above the grizzly sill.

The transfer raises have a 6- by 6-foot rock section but contain cribbed rings to the grizzly level. Steel junction sets are used at backover. Cross section inside the cribbed rings is 4 by 4 feet, giving a total holding capacity of about 65 tons including the backover raise.

The three haulage crosscuts under each panel connect at both ends with the haulage loop. Trains enter in one direction only and leave by the other.

Undercutting

Undercutting is pushed quite hard at the present time in order to reach full capacity status. For the first part of the year, new stopes were caved every six weeks. With only one exception it has not been necessary to use boundary weakening in order to cantilever the ore and start the caving action. The use of corner raises on the undercut level is common, however, in order to square them off.

Drifting and crosscutting on the undercut horizon dovetails with panel development. All draw raises are first holed with undercut development near the block perimeter. Successive drifts are then driven over the tops of the remaining finger raises. The heavy ground usually requires the installation of temporary stull sets in undercut workings. Before blasting remaining undercut pillars, one side of the headings is slashed out to gain an additional 3- or 4-foot width, or until a pillar remains which is not thicker than seven feet. The pillars are then drilled and blasted electrically. Holes are augered in the timber sets and loaded with powder prior to blasting. Generally, undercutting retreats from one corner of a block in the panel to a diagonally opposite corner.

Immediately after undercutting and caving a new stope, 400 tons of ore are drawn from each finger raise as rapidly as possible. This corresponds to a 20-foot draw, and gives the height necessary to weaken the undercut zone and to let the caving action work for the miners rather than against them. The rapid initial draw is essential to induce normal breakage of large blocks through attrition in a working mass of ore. From then on, the rate of draw from the caved column is increased to 12 inches per day which will furnish 20 tons of ore from each finger raise.

Checkerboard Stopes

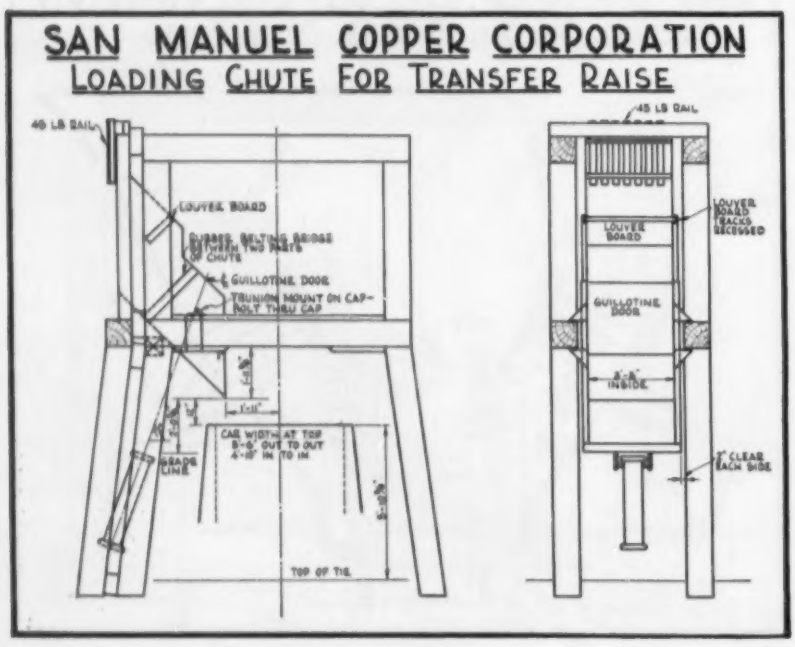
The ground in the San Manuel mine lends itself quite well to block caving. Fracturing and jointing is quite complex and extensive. Three definite fracture systems have been noted. The ground is weak enough to cave without using some type of priming such as boundary weakening.

A checkerboard pattern of blocks is being used in the various panels to prevent excessive ground pressures. A block is never undercut adjacent to an active stope. Here again, the desirability of maintaining complete control over the caving area was paramount. San Manuel is not using a full panel draw because of the possibility of dilution, the loss of some control over drawing (as compared to block system), and because of the weight problem. Another very good reason is that by using a full panel draw a great proportion of the normal daily production is tied up in one set of haulage crosscuts. By spreading production out over several panels, there is an added flexibility in the haulage level with less likelihood of delays at train loading points.

Blast Twice Each Shift

A stope engineer directs the drawing and repair of blocks on the grizzly level. He has two blocks under his supervision. He designates, each day, the amount of ore to be drawn from the various finger raises and generally oversees the activities of the chute tappers and repair men working through the draw boss and repair boss in his blocks. He notes what repairs are needed in his blocks, and keeps track of the repair contracts. Graduate engineers with draw boss and repair boss experience are used for this job.

All blasting to free plugged chutes or raises and grizzly drift development is done twice a shift—at the break for



the meal and at the end of the shift. The mining area is wired in two 220-volt circuits and the charges are set off by pushbuttons from one central location. A special crew on each shift handles the blasting assignment and they free draw raises in blocks to be pulled by the on-coming shift. The following shift is then sure of having free raises at the outset. When a hang-up occurs, it is reported and the blaster on following shifts handles the problem.

Central Traffic Dispatcher

The haulage loops are tracked with 90-pound rail on a 36-inch gauge. Through the haulage crosscuts, where the transfer raises are located, 70-pound rail is used. Mine cars carry 12-ton payloads and are pulled in 15-car trains by 23-ton, 250-horsepower trolley locomotives. The trolley system is 250-volt direct current. When the mine is in full production, 10 ore trains will be required to handle 10,000 tons per shift.

Each locomotive is equipped with a radio telephone and trains are controlled by a central dispatcher. A block signal system, actuated by manually operated contactor switches, also acts as a safety device for motormen, and turns signal lights to red as a train enters a block.

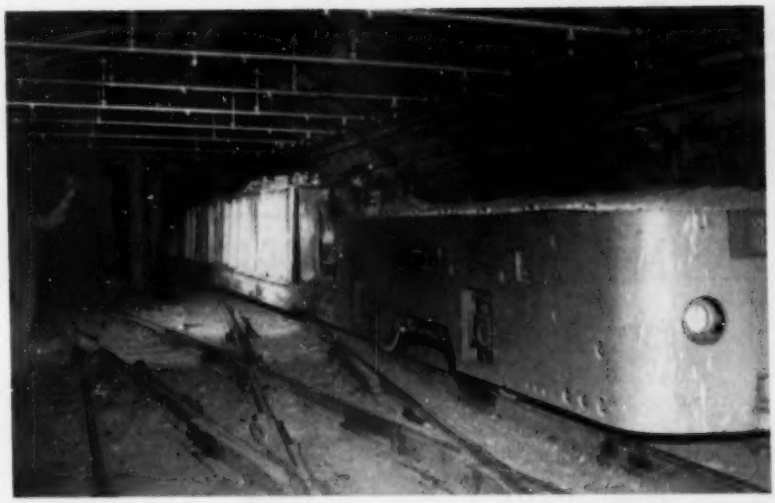
The locomotives are equipped with three separate sets of brakes—electric dynamic braking, air brakes, and manual brakes. In event a pole is lost while a train is underway on a grade, the electric lights, dynamic brakes and air brakes will still function. Each locomotive also features overspeed and deadman controls. A trolley retracker automatically retracks poles which have jumped from the line. The grade on the loop is maintained at 0.5 percent in favor of the load.

Three rectifier stations along the loop maintain full voltage throughout the trolley line.

39 Minute Round Trip

The time required to complete a round trip from transfer raise to shaft and back is about 39 minutes. This is broken down into seven minutes travel time from a panel in the center of the stoping area to the shaft; five minutes for dumping at the shaft; seven minutes for return to the transfer raise; 20 minutes to load. Any reduction in this time can only come at the loading end, and thorough training of motormen and car loaders to synchronize train loading.

At each transfer raise, the car loader, who pulls the chutes, has a cord within easy reach which is attached to a light. Using the cord, he signals the motorman so that he can spot cars under the various raises. The motormen and car loaders must learn to work together since the motorman, of course, quite often can't see what is going on at the transfer raise stations. Generally, the motorman returning to a block will run the train all the way through the haulage crosscut and then back the train in to spot cars under transfer raises. This is done so that the train returns under the raise against the track grade and takes all the slack out of the couplings. Thus it is easier to spot cars under the raise without jockeying the train back and forth.



ROUND TRIP from transfer raises to shaft and back requires about 39 minutes with 23-ton trolley locomotives hauling 15 car trains. Payload on each car is 12 tons. Arched steel sets are commonly used on haulage level where ground is heavy.

New Chutes

Of special interest to production men are the newly designed chutes at the transfer raises. Designed by the San Manuel staff, these chutes are a floating type, completely independent of ground support. Ground movement will not distort the chute. The steel chute is mounted on trunions supported by two caps in adjacent drift sets. An undercut guillotine door is operated by an 8-inch air cylinder. The air cylinder and door guides are suspended by H-beams and angle irons which are bolted to the bottom of the chute slide. The guillotine door is power operated both up and down. One water spray is located to spray the top of the ore stream as it passes through the chute and a second spray operated from the underside of the lip of the chute to wet the underside of the ore stream as it leaves the chute.

Activities between the grizzly level and the haulage level are coordinated by an audio system. Speakers are placed in each panel on the grizzly and haulage levels. Chute tappers and the draw crew on the main level can remain in contact.

Skips In-Balance

The twin ore hoisting shafts each contain two skipways which are separated by the manway, with service cage compartment at one end. Both shafts are lined with concrete, and individual compartments measure 7 feet 6 inches, center line to center line of dividing curtain, by 6 feet wide. Skips equipped with heavy duty rubber-tired wheels travel along steel shaft guides.

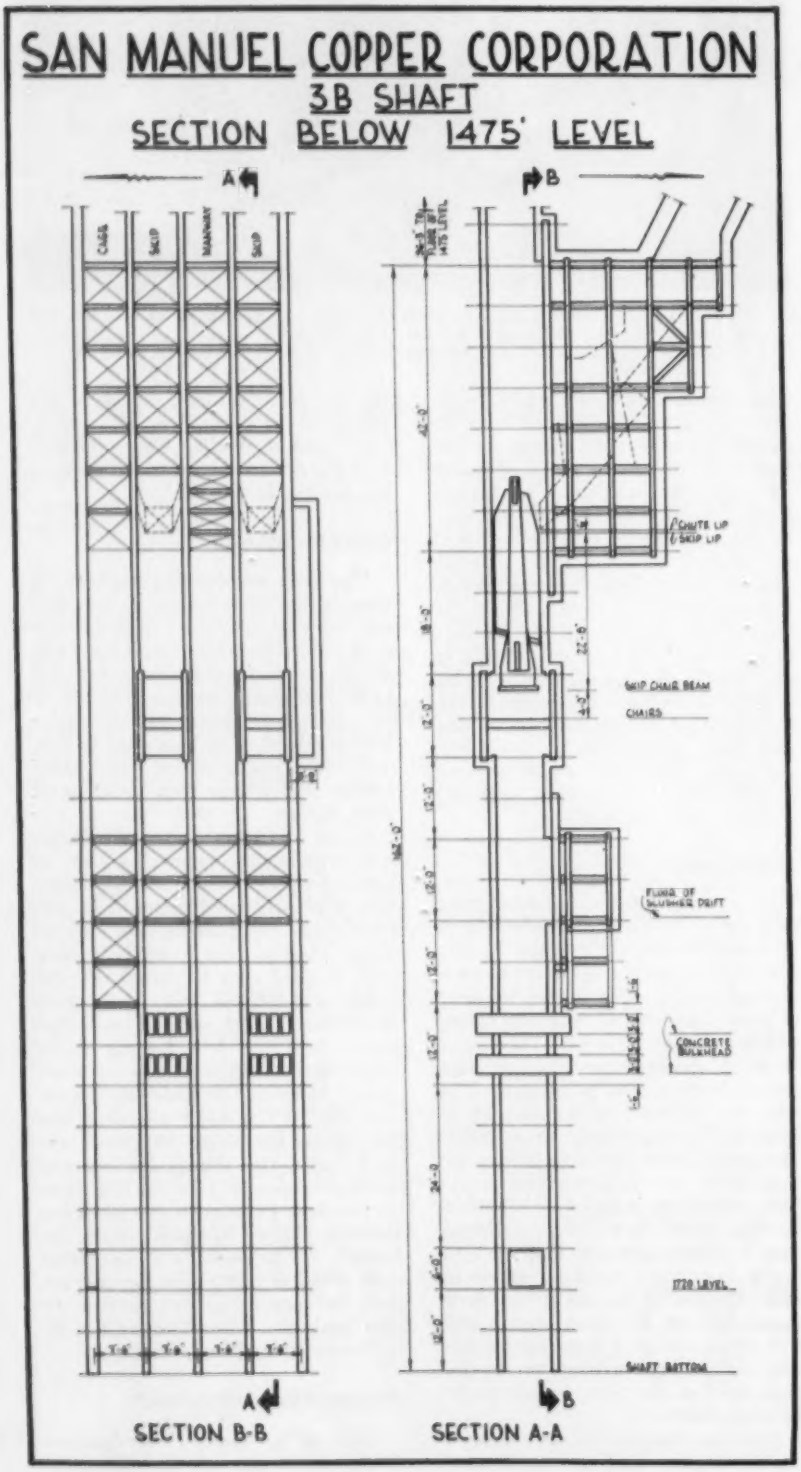
Trains reaching one of the shafts are emptied, three cars at a time, in a rotary tipple. When in full production it is anticipated that a train will travel over the pockets every six to seven minutes. The pocket at each shaft is lined with 60-pound rail and holds a 1,200-ton live load. Two measuring pockets, with air controlled doors, load the Jeto bottom dump skips to 18¾-ton capacity at each shaft. Hoisting is done semi-automatically by the skip tender from the bottom of the shaft. He starts the cycle, after the skip is loaded, and automatic controls take the skip from the loading position to the dumping position. Skips in each shaft are hoisted in balance. The maximum rope speed is 3,000 feet per minute, and the capacity of one shaft is 60 skip loads per hour. The hoist cable is 2¾-inch, 6 by 19 wire rope.

Pipe and Conduit Tunnel

Each of the two 15-foot diameter hoists at Number 3A and 3B shafts

are powered by two 3,000-horsepower motors, a total of 6,000 horsepower on each hoist. Both units are located in a single hoist house. The electrical substation is behind the hoist house, and all electric cable, water pipe, signal circuits, and control circuits connect with the shafts 10 feet below the surface through a branching tunnel linking the manways and the substation.

The headframes over each of the ore hoisting shafts are 180 feet high, and contain 14-foot diameter head sheaves. Bottom dump skips discharge ore to a circular 60-foot diameter, 5,000-ton capacity steel bin at each shaft. Ore is hauled to the mill 7.5 miles away, at the town of San Manuel, over standard gauge ore track in 30 car trains pulled by a 1,600-horsepower, 125-ton Diesel-electric locomotive. The capacity of each railroad car is 100 tons. The ore cars are loaded from four chutes placed in two rows below the bin. Actually, two trains can be loaded simultaneously from the bin.



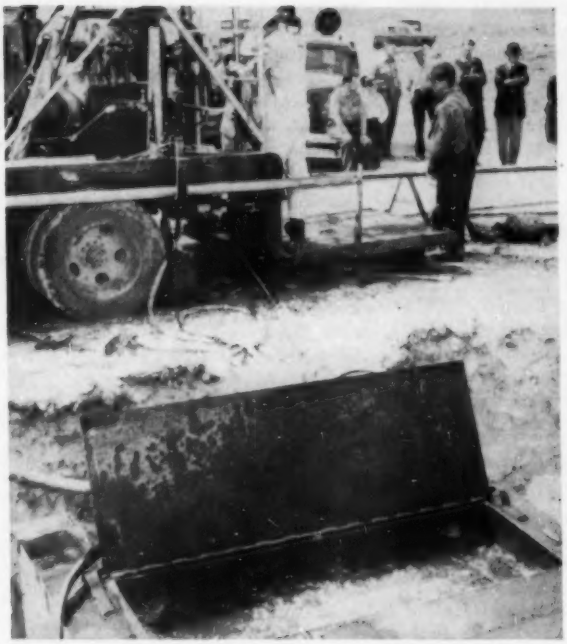
No. 4 Service Shaft

The Number 4 shaft is the primary servicing facility for the mine. The mine dry, warehouse, and timber yard are located near this shaft. The perimeter of the shaft is concreted and compartments are separated by 8-inch steel, H-beam dividers. Two large compartments in the shaft measure 8 by 14 feet accommodating 7½- by 13½-foot double deck cages. Two circular segments at the ends of the shaft serve as a manway, power cable way, and as the main air course into the underground workings. Each cage holds 100 men.

Downcast ventilation to the 1415 grizzly level is maintained through Number 1 and Number 4 shafts with the Number 4 shaft carrying 75 percent of the load. The air flows through the grizzly level, aided by auxiliary fans, down through transfer raises to the 1475 haulage level and up 3A and 3B ore hoisting shafts and Number 2 development shaft.

Slusher Draw

A slusher draw method will be utilized in panel Numbers 2, 3, and a portion of panel 4, cutting down on the amount of development required to recover the ore. The thickness of the deposit at the extreme eastern end is much less due to the pitch of the assay limit at the top. These panels are laid out on 210-foot centers with a 35-foot pillar between adjacent panels. Haulage crosscuts on the 1475 level are spaced on 192-foot centers, near the edge of each panel. Slusher drifts on the 1415 level are 63 feet above the haulage level sill and the undercut level 25 feet above the slusher drift sills. Slusher drifts are spaced on 35-foot centers with a pair of finger or draw raises placed on opposite sides of the slusher drift every 17.5 feet. Transfer raises from the haulage crosscuts will hole each end of the slusher drifts 26.25 feet from the panel drift. Hoist installations will be made at each end of the panel so that the maximum slushing distance will approximate 70 feet.



DIESEL FUEL AND DRY ICE is the mixture you see contained in the cooling tank in foreground. The fuel is chilled to 0°F., and is circulated in drill hole to freeze core.

DRY ICE FLOATS IN DIESEL OIL cooling tank. From left are: Jerry Powell, Standard Oil engineer; L. K. Lewis, Riverton, Wyoming Standard agent; and Don Snow, Lucky Mc geologist. *Standard Torch* Photo

How Ice Cooled Diesel Oil Recovers More Core in Wet Shales and Sands

By HOWARD F. BARTLETT

Core recoveries of 98 percent are now commonplace in diamond drilling the wet uranium-bearing unconsolidated sands and gravels of the Wind River formation in central Wyoming. The high recovery is achieved by using No. 2 Diesel fuel chilled with dry ice as a drilling fluid. This new drilling technique supplants standard methods which resulted in only a 60 to 70 percent recovery.

This method is currently being used by Sprague and Henwood Drilling Company at the Lucky Mc-Utah Construction Company uranium mine, located in the Gas Hills area of Fremont County, Wyoming. It was developed with the assistance of J. H. Bailey, project manager for Utah Construction Company; D. C. Anderson, chief geologist for Lucky Mc; with the assistance of Don Snow and the writer. The core driller for Sprague and Henwood was R. G. Henderson. Lowell Morfeld, one of the owners of Lucky Mc, helped design a suitable cooling tank.

Mr. Bartlett is geologist for the Lucky Mc Uranium Corporation and the Utah Construction Company, Lander, Wyoming.

How Process Was Developed

Low winter temperatures made it impossible to use water for drilling fluid so Diesel fuel was tried because it wouldn't freeze. Use of Diesel fuel then made it possible to continue coring, where necessary, throughout the winter. Oil loss was high so its use was kept to a minimum. Only when very wet areas were encountered and it proved impossible to recover good samples by dry drilling did the drill geologist resort to using Diesel oil.

With the Diesel oil, core recovery improved. It was also observed that the porous, wet sands were somewhat frozen on these coldest days. With this in mind, the drill was moved to an area where the formation was very coarse, unconsolidated sands and gravels with a few shale lenses and an abundance of water. Dry rotary air drilling in this area had not obtained any accurate samples.

A conservation program was started to cut all unnecessary loss at the collar and in the return line to the cooling tank. An insulated tank was built to help maintain a more constant temperature. Bill Williams of Sprague and Henwood helped revise the drilling procedure and during the next month the Diesel consumption was cut in half. Here's how the method works today.

Preparations for Coring

A. A 5⅛-inch hole is plugged to the coring zone by a rotary type drill rig (Mayhew or Failing) using Aquajel and water for a drilling fluid. The plugging rig must be level so that a straight hole will be drilled to facilitate casing.

B. A cooling tank pit 20 feet in length, 10 feet wide, and four feet deep is then dug by a bulldozer for the skid mounted cooling tank. The tank can be towed into the sump pit. The cooler is made from two, round, stock water tanks, mounted one inside the other, five feet and six feet in diameter, respectively. They are 2½ feet in height and are insulated with bats of balsam wool. The tank capac-

ity is 300 gallons. A new tank is being built that is rectangular with a capacity of 400 gallons, to be insulated with vermiculite or some such loose material. It has been designed to provide better cooling for warmer weather. The tank should be one foot lower than the ground level so as to provide for gravity return of oil and cuttings from the top of the casing. The return line is a 10-foot joint of NX size casing which fits on a special casing "T." The coupling for the return line is welded to the casing "T" with a slight downward angle. This angle provides for enough drop in the return line so that the cuttings are carried out of the line and into the tank, where they are periodically cleaned out.

C. The coring rig moves over the hole and sets 4-inch casing to the bottom. After casing is seated, it must be flushed with water and air to clean out the mud which works up inside. All necessary rigging up is done and then coring can begin.

Preparation of Diesel Fuel

The tank is filled with fuel and 500 to 600 pounds of dry ice are broken up and dropped onto a metal platform in the tank. The platform is used to keep the ice off the bottom of the tank, which seems to produce a better chilling effect. Special note should be made of the tendency for Diesel fuel to gel on the surface, forming a coating or partial insulation. The ice should be stirred at intervals to knock off the coating thus formed. Ice and fuel are added as necessary during the drilling.

Coring

A. When the Diesel fuel reaches a temperature of 0° F. it is circulated for 10 minutes to freeze the ground at the bottom of the casing.

B. Coring is then started with a short run of two to three feet which is sometimes necessary to clean the hole of pebbles that have fallen in or worked down when running casing. Coring runs of 10 feet are then made. An extra core barrel is used to facilitate getting the rods back into the hole, and circulation is resumed in the shortest possible time so as not to allow the walls to thaw. The geologist and the drill helper can pull the core, which comes out very nicely. On several occasions, a solid 10-foot core has been removed intact from the core barrel.

C. A 2⅜-inch (NX size) core barrel and regular "M series" bits with four waterways have given the best results. A 3⅜-inch core barrel with a bottom discharge bit was tried but wasn't satisfactory, due possibly to too large an area to freeze.

D. Thirty to 40 feet are cored and then the hole is reamed with a 3⅜-inch rock bit and water or air. A second string of casing (NX Size) then is set through the four-inch casing to the bottom. Coring is resumed with 30 feet being the limit through the small casing. If it is necessary to core further, the NX size casing must be pulled, the hole reamed, and casing reset again.

Costs for Frozen Drilling

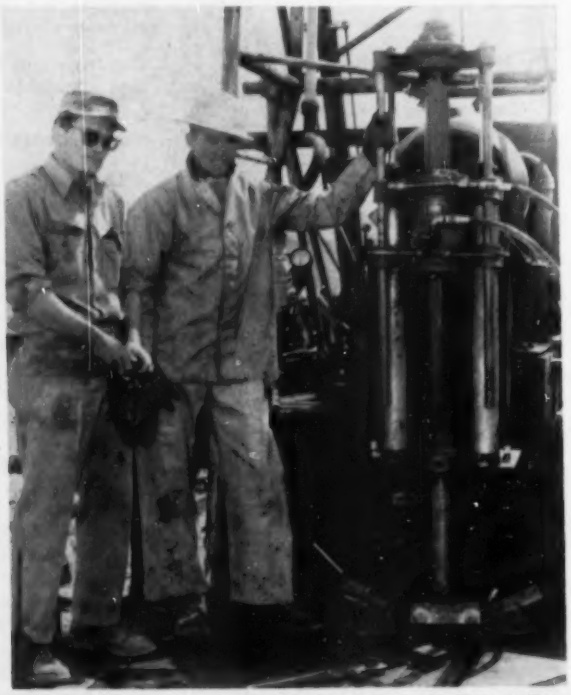
Current drilling costs are about 60 percent above contract coring rates due to dry ice costs and oil loss; however, core recovery is running about 98 percent for this method versus a high of 60 to 70 percent for water coring with good possibilities that core losses also occur in the ore horizons. Evaluation of any cost figure must include comparison of results, and a thorough exploration program needs maximum core recovery. It is anticipated that "extra" drilling costs with this method will be reduced as more work is done and other refinements are utilized.

Conclusions

A method has been found to obtain good samples from water-saturated unconsolidated sands in the Gas Hills district.

Current costs are relatively high, but procedural refinements in the short period of usage have cut these costs considerably and should continue to do so.

A CLOSEUP VIEW of a piece of frozen NX core. By freezing cores, accurate samples may be taken from the drill holes in loose sands and gravels of central Wyoming.



DRILL CREW who perfected the Diesel oil fluid drilling technique at Lucky Mc uranium mine. Left is Howard Bartlett, geologist with R. G. Henderson, driller.

An Introduction To . . .

Marling J. Ankeny New Director of the U. S. Bureau of Mines

Marling J. Ankeny, right, is sworn in as director of the U. S. Bureau of Mines as Secretary of the Interior, Fred A. Seaton, center, watches. Floyd E. Dotson administers oath.

Q. When did the President nominate you for Director of the U. S. Bureau of Mines?

A. President Eisenhower sent my nomination to the United States Senate on June 19, 1956.

Q. Did you actively seek this position?

A. Yes, I did. My long association professionally with the Bureau and my contacts with the Bureau since leaving it in 1952 familiarized me with many aspects of the Bureau's work and with the people who were engaged in carrying out its activities. Thus I acquired a deep respect for the many capable professional and administrative workers and learned to appreciate not only the very fine and valuable accomplishments of the Bureau but also the possibilities and opportunities for expanding and strengthening the Bureau's useful programs.

Q. When did you appear before Senate Interior Committee?

A. I appeared before the committee on July 12, 1956.

Q. When did the committee recommend confirmation?

A. The committee took a vote July 17, to recommend my confirmation to the Senate as a whole.

Q. When did the Senate confirm appointment?

A. The Senate approved it on Thursday, July 19.

Q. When were you sworn in as Director?

A. I was sworn in as Director on Friday morning, July 20.

Q. Is this the second time you worked for the Bureau?

A. Yet, it is. However, I was away from the Bureau for about two years during the war—from October 1943 to September 1945—when I served with the Navy under an engineering designation during which time I was engaged in harbor clearance operations for the invasion of Normandy and Brittany; and later was attached to the Safety Branch, Executive Office of the Secretary of Navy.

Q. When, where, and what were your earlier positions and duties with the Bureau?

A. I began my career with the Bureau of Mines in 1928 and during the next 24 years held numerous positions and carried out duties that took me to all sections of the United States. My first job was as a first-aid miner. I was assigned to duty on one of the Bureau's mine rescue cars in 1930. After several advances, I was promoted through the various professional grades of mining engineering until I had reached the rank of senior mining engineer in 1943 with the operational title of assistant supervising mining engineer of the Bureau of Mines at Pittsburgh, Pennsylvania.

Upon my discharge from military service in the fall of 1945 I became assistant supervising engineer of the Bureau's District C, headquartered at Mount Hope, West Virginia, where I helped direct the administration of general coal mine inspection activities and health and safety activities. Two years later I was promoted and transferred to the Washington office as special assistant to the chief of the Health and Safety Division. The following summer I became chief of the Coal Mine Inspection Branch with primary responsibility for the administration of the nationwide coal mine inspection activities of the Bureau.

Although my principal activities with the Bureau have been in the field of coal mining, I participated in many projects concerning the metal mining industry and its operational problems. The studies included iron mining in Michigan; gold mining in South Dakota and California; copper, lead, and zinc mining in Montana, Utah, Arizona, Missouri, and northern New York.

Q. Where and when did you graduate from college?

A. I was graduated from the college of engineering of the Carnegie Institute of Technology in June 1923. Prior to and during my college career I was employed at various occasions in the coal mining industry ranging from general mine laborer up to general mine foreman.

Q. Where did you work after graduation?

A. After graduation and until joining the Bureau I worked for the National Mining Company at Morgan, Pennsylvania, a subsidiary of the United Steel Corporation.

Q. Why did you leave the Bureau in 1952?

A. I left the Bureau in 1952 for financial reasons. The government remuneration made it difficult for me to support my family, including a wife and two growing daughters, on my then salary and the offer of a substantial increase on the outside couldn't be refused.

Q. Where did you go and what company did you work for?

A. I joined the Bituminous Coal Operators' Association with headquarters in Washington, D. C., as safety director, working under the late Harry Moses. The Association represents coal operators that produce about one-half of the nation's tonnage of soft coal.

Q. Did you work for this association until your nomination?

A. Yes, from the time I left the Bureau until I returned.

Q. Do you know that the metal miners consider publication of the annual *Minerals Yearbook* one of the Bureau's important functions to aid them?

A. I am aware of the high regard that all of the mineral industries have for the *Minerals Yearbook* and the Bureau's numerous statistical and economic publications.

Q. For what year was the last published Yearbook?

A. The last Yearbook published was in three volumes and covered 1952. The material for the 1953 volumes was submitted recently to the Government Printing Office and delivery is expected soon; volume II already is out.

Q. Will you shorten the publication lag?

A. The current lag in the publication of *Minerals Yearbooks* is attributed to several causes. Owing to the Korean emergency, the efforts of the small *Yearbook* staff had to be diverted to other more urgent assignments and this resulted in a build-up of a substantial backlog of work in 1950-1951. Immediately following this, the Bureau was reorganized, and responsibility for preparation of the *Yearbook* was transferred to operating divisions; responsibility for collecting mineral production statistics (other than for fuels) decentralized from Washington to eight field offices; and a 3-volume *Yearbook* initiated. Further, mineral production data for 1954 were collected cooperatively with the Census Bureau for the first time when the Census of the Mineral Industries was made.

When the publication of the *Yearbook* was delayed, it was recognized that the Bureau program for preliminary release of statistical data in area reports and Mineral Market Surveys must be strengthened and expedited to make information available to the public as soon as possible. This has been done. The publication of preliminary state data is a noteworthy addition to the series of preliminary releases. And it is a fact that the mining people of the country have better, more comprehensive, and more up to date information provided them now on production, distribution, marketing, uses, stocks, etc., on mineral commodities than ever before.

Q. How will you have the Bureau work on a realistic domestic mineral problem?

A. Because any program devised will have far-reaching implications, some going beyond the area of concern of the Bureau of Mines or the Department of the Interior, the Bureau's role in its formulation is one of a principal participant and source of basic data from which sound and realistic policy determinations can be made.

The Bureau's principal continuing obligations include the development of factual and current information relative to the status and welfare of the domestic minerals industry and the conduct of scientific investigations aimed at improving the Nation's mineral position.

Q. How long will it take to formulate this program?

A. The Secretary of the Interior has stated that a program will be proposed and recommended within a year. The Bureau of Mines will have information for the program well within that period.

Q. Where will you submit this program?

A. All information relative to this program that is a product of the Bureau of Mines will be supplied to the Assistant Secretary for Mineral Resources in the Department of the Interior.

Q. What changes will you make in the Bureau's research programs?

A. The Bureau's system of formulating research programs based upon most apparent needs has been highly developed during the past three years and comprises one of the most advanced systems for programming research work practiced anywhere. The system is implemented by a rigidly formalized procedure for (1) Proposing new work or the continuance of old work; (2) Translating proposals into action programs through normal budgetary processes and justification before appropriate committees of Congress; and (3) Appraising the conduct and results of such programs including the publication and distribution of significant results insuring that effort is expended in the most productive channels. I propose to support the system.

Q. How will your coal safety experience help the metal miners?

A. Although, as I have explained before, my experience has not been limited strictly to coal mine safety, knowledge, and training in the field of coal mine safety can be helpful to the metal miners. With respect to safety, certain fundamental problems are similar or common.

One more thing: the fact that my own personal experience has been related so largely with coal-mine safety does not necessarily mean that I approach my position with any preconceived ideas of putting Federal inspection or compulsory safety measures into the metal mines of the west.

Q. Will you schedule any visits to western mines?

A. Yes, indeed, I have tentatively drawn plans to visit some of the Bureau's western experimental stations, laboratories, and offices at an early date and shall try at such a time and on other occasions when feasible to visit mining operations in the West.

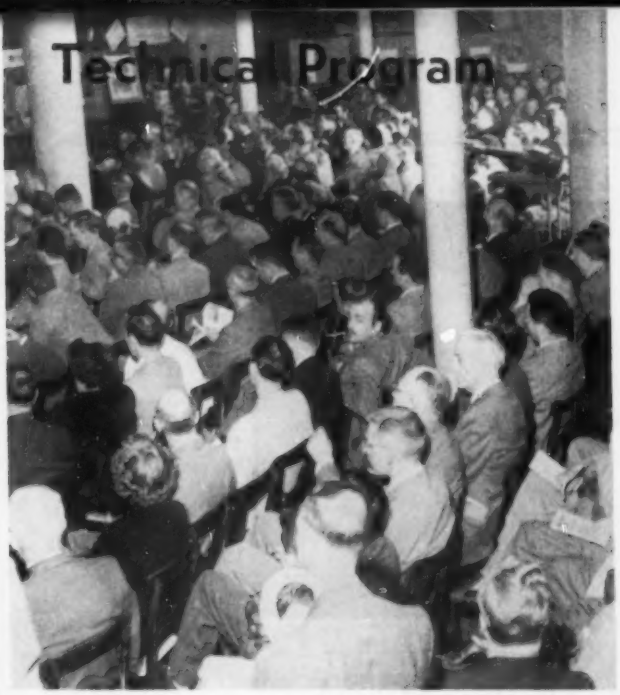
Q. In your opinion what are the greatest services the Bureau can render to western miners?

A. On the premise, in which I believe, that a good healthy mining industry is essential to the prosperity and security of this country, I think that the Bureau of Mines can render its best service through research and technologic and economic investigations which might result in the development of more productive and less expensive mining and more efficient ways of devising testing methods of utilizing lower grade and complex ores and in undertaking other projects designed to establish and maintain a strong domestic mining industry.

Q. What can western miners do to help you as Director?

A. The western mining industry has always been extremely cooperative with the Bureau. Whether big or small, and whether as an individual or as representatives or organizations, the mineral industry of the west can be of help to us by informing us of their problems and by bringing to our attention the avenues by which the Bureau can best conduct and carry out its activities as prescribed by law.

Technical Program



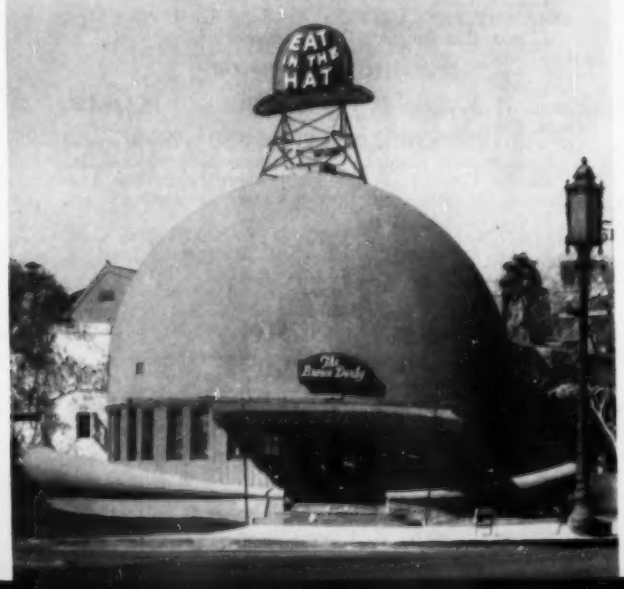
Field Trips

All Roads Lead to Los Angeles For the Greatest Mining Show

Something for everybody in the mining industry is the Los Angeles slogan for the 1956 Metal Mining Show and Machinery Exposition at the Shrine Auditorium, October 1st through 4th with field trips on Friday, the 5th. For the production man—the man who gets the muck out—there will be the latest full-size operating units of leading manufacturers. Learn what these new machine can do at your mine.

For the engineer—the man who designs tomorrow's mines—there is a program where industry speakers tell of technical advances. For everybody—and that includes the families—are fabulous Disneyland, Hollywood, trips, and entertainment. "These are the reasons everybody should attend."

Entertainment



Exh

Program Chairman
WALTER C. LAWSON
General Manager, Western Operations
Phelps Dodge Corporation

General Chairman
GARNER A. BECKETT
President
Riverside Cement Company

The technical program covers four days with several concurrent sessions. Study this preliminary program to find out the day on which the paper of greatest interest to you will be presented. Main program sessions have been finalized, but additions and changes to the speakers list are anticipated.

MONDAY MORNING, OCTOBER 1

OPENING SESSION

Presiding: Howard I. Young, President, American Zinc Lead and Smelting Company.

NATIONAL MINERAL POLICIES: Hon. Clair Engle, U. S. Representative from California; Chairman, House Interior & Insular Affairs Committee

MONDAY AFTERNOON, OCTOBER 1

MILLING AND METALLURGY

Chairman: Roy A. Hardy, Cons. Engr., Getchell Mine, Inc., Reno, Nev.

WET VS. DRY GRINDING: Fred C. Bond, Cons. Engr., Allis-Chalmers Mfg. Co., Milwaukee, Wis.

CYCLONES AT CHINO: Paul A. Lemke, Kennecott Copper Corp., Hurley, New Mex.

ELECTROSTATIC SEPARATION: J. Hall Carpenter, Carpco Eng. Co., Jacksonville, Fla.

EMULSION FLOTATION: A. W. Fahrenwald, Dean Emeritus, School of Mines, U. of Idaho, Moscow, Idaho.

TUESDAY MORNING, OCTOBER 2

INDUSTRIAL MINERALS

Co-Chairmen: D. L. Marlett, Vice-Pres., Great Lakes Carbon Co., Los Angeles, Calif., and Wallace W. Mein, Jr., Pres., Calaveras Cement Co., San Francisco, Calif.

CERAMIC RAW MATERIALS: Richard F. Brooks, Mgr. of mining operations, Gladding, McBean & Co., Los Angeles, Calif.

WHAT IS ECONOMIC GYPSUM DEPOSIT?: J. F. Havard, Vice-Pres., Fibreboard Paper Products Corp., San Francisco, Calif.

CALIFORNIA CEMENT MATERIALS: Oliver E. Bowen, Jr., Calif. Div. of Mines, San Francisco, Calif.

LIGHTWEIGHT AGGREGATES: Dr. Paul W. Leppla, Dir., Great Lakes Carbon Corp., Los Angeles, Calif.

EXPLORATION AND GEOLOGY

Co-Chairmen: Ira B. Joralemon, Consulting Engr., San Francisco, Calif.; James Boyd, Vice Pres. Exploration, Kennecott Copper Corp., New York, New York.

RECENT SUCCESSFUL EXPLORATION: Ira B. Joralemon, Consulting Engr., San Francisco, Calif.

ORE DISCOVERIES: John K. Gustafson, Geol., M. A. Hanna Co., Cleveland, Ohio; Francis Cameron, Vice Pres., St. Joseph Lead Co., New York, New York; Paul T. Allsman, Chf. Mng. Engr., U. S. Bureau of Mines, Washington, D. C.

URANIUM MILLING

Chairman: Marvin L. Kay, Vice Pres. & Gen. Mgr., Climax Uranium Co., Grand Junction, Colo.

URANIUM METALLURGY: James L. Lake, Mgr. Process Div. Union Carbide Nuclear Co., Grand Junction, Colo.

ANACONDA'S BLUEWATER MILL: E. C. Peterson, Asst. Mgr., and D. C. Matthews, Chief Metallurgist, The Anaconda Co., Grants, New Mex.

URANIUM REDUCTION'S NEW MILL: Roy F. Hollis, Gen. Mgr., Uranium Reduction Co., Moab, Utah.

NEW DEVELOPMENTS IN PROCESSING: C. K. McArthur, Mgr. of National Lead Co. AEC Pilot Plant, Grand Junction, Colo.; E. H. Crabtree, Mgr., Colorado Research Foundation, Inc., Colorado School of Mines, Golden, Colo.

SOLVENT EXTRACTION: Woodrow Knott, Plant Mgr., Climax Uranium Co., Grand Junction, Colo.

DRILLING SYMPOSIUM

Chairman: O. A. Rockwell, Vice Pres., The Eagle-Picher Co., Miami, Okla.

STANDARDIZATION OF MEASUREMENTS: Raymond Stewart, Asst, Planning Engr., Climax Molybdenum Co., Climax, Colo.; L. F. Bishop, Research Engr., The Anaconda Co., Butte, Mont.; S. S. Clarke, Consulting Engr., Baxter Springs, Kans.

MAINTENANCE OF DRILLS, BITS AND STEEL: C. N. Kravig, Mine Supt., Homestake Mining Co., Lead, S. Dak.; T. E. Giggey, Sales Repr., Ingersoll-Rand Co., New York, New York; George Hazen, Plant Supt., Brunner & Lay Co., Los Angeles, Calif.; N. L. McCombs, Eng., Joy Manufacturing Co., Claremont, N. H.

OPEN PIT MINING

ROTARY DRILLING BLAST HOLES: R. W. Whitney, Mgr. of Mines, M. A. Hanna Co., Cleveland, Ohio.

EAGLE MOUNTAIN DRILLING: Kenneth B. Powell, Supt., Raw Materials, Kaiser Steel Corp., Fontana, Calif.

TRANSPORTATION FROM PITS: Lloyd S. Campbell, Asst. Gen. Supt., Oliver Iron Mining Div., Virginia, Minn.; Richard P. Cardew, Engr., National Iron Co., Duluth, Minn.

WEDNESDAY MORNING, OCTOBER 3

PUBLIC LAND PROBLEMS

Chairman: Hon. William A. Dawson, U. S. Representative from Utah.

PUBLIC LAWS 167 AND 585: Hon. Wesley A. D'Ewart, Assistant Sec. of Interior for Land Management; Edward P. Cliff, Assistant Chief, U. S. Forest Service.

CURBING MILITARY WITHDRAWLS: Hon. Cliff Young, U. S. Representative from Nevada.

LEGAL NEEDS OF NEW EXPLORATION TECHNIQUES: Elmer F. Bennett, Assistant to the Secretary of the Interior; Robert S. Palmer, Exec. Vice Pres., Colorado Mining Association, Denver, Colo.; C. Jay Parkinson, The Anaconda Co., New York, New York; Clair M. Senior, Senior & Senior, Salt Lake City, Utah; Roger H. McConnel, Chief Geol., The Bunker Hill Co., Kellogg, Idaho; Richard N. Hunt, Vice Pres., U. S. Smelting Refining & Mining Co., Salt Lake City, Utah.

UNDERGROUND MINING

Chairman: John D. Bradley, Pres., Bunker Hill Co., San Francisco, Calif.

SUPPORT OF HEAVY GROUND: R. W. Edwards, Supt., Inland Steel Co., Ishpeming, Mich.; J. W. Still, Consulting Engr., Prescott, Ariz.

UNDERGROUND URANIUM MINING: Donald T. Delicate, Supt. of Utah Mines, Homestake Mining Co., Moab, Utah.

UNDERGROUND TRANSPORTATION: John Currie, Resident Mgr., American Zinc, Lead & Smelting Co., Metaline Falls, Wash.; J. E. Tong, Asst. Mgr., Duval Sulphur & Potash Co., Carlsbad, New Mex.; Gil Montgomery, Vice Pres., Fluorspar Div., Minerva Oil Co., Eldorado, Ill.

MILLING & METALLURGY

Chairman: F. A. McGonigle, Vice Pres., Haile Mines, Inc., Henderson, Nev.

CONVEYING AND WEIGHING SYSTEM: Melvin A. Stokke, Supt. of Crushing, Anaconda Reduction Works, Anaconda, Mont.

OXIDATION, REDUCTION AND LEACHING: Frank A. Forward, Head, Dept. of Mining & Metallurgy, U. of British Columbia, Vancouver, B. C., Canada.

SOLVENT EXTRACTION: R. S. Olson Metallurgist, Dow Chemical Co., Pittsburgh, Calif.

WEDNESDAY AFTERNOON, OCTOBER 3

MANAGEMENT PROBLEMS

Chairman: Clark L. Wilson, Vice Pres., New Park Mining Co., Salt Lake City, Utah.

MINING'S SHORTAGE OF ENGINEERS: Morrough P. O'Brien, Chairman, Dept. of Engineering, U. of C., Berkeley, Calif.

NON-PRODUCTIVE WAGE COSTS: L. J. Randall, Pres., Hecla Mining Co., Wallace, Idaho.

EDUCATION OF EMPLOYEES: Howard B. Gundersen, Asst. Dir. of Industrial Relations, Kennecott Copper Corp., Salt Lake City, Utah.

INCENTIVE PLANS: John Edgar, Mgr., Mine Div., Sunshine Mining Co., Kellogg, Idaho; Theodore Barry, Pres., Theodore Barry & Associates, Los Angeles, Calif.

URANIUM EXPLORATION & MINING

Chairman: T. O. Evans, Chief Mining Engr., The Atchison, Topeka & Santa Fe Railway Co., Prewitt, N. Mex.

URANIUM DEVELOPMENTS: A. E. Jones, Mgr., Grand Junction Operations Office, U. S. Atomic Energy Commission, Grand Junction, Colo.

JACKPILE OPEN PIT: Albert Fitch, Mgr., and John Herndon, Mine Supt., The Anaconda Co., Grants, N. Mex.

GUNNAR URANIUM DEPOSIT: J. N. Botsford, Gunnar Mines, Lake Athabaska, Sask.

AFTER 1962 FOR THE INDEPENDENT URANIUM MINER: "Buffalo" Kennedy, Rio de Oro Uranium Mines, Inc., Albuquerque, New Mex.

THURSDAY MORNING, OCTOBER 4

STATE OF METAL MINING

Chairman: Walter C. Lawson, Gen. Mgr., Phelps Dodge Corp., Douglas, Ariz.

NONFERROUS METALS: Simon D. Strauss, Vice Pres., American Smelting & Refining Co., New York, New York.

IRON ORE: Walter A. Sterling, Pres., Cleveland-Cliffs Iron Co., Cleveland, Ohio.

LIGHT METALS: Lawrence Litchfield, Jr., Vice Pres., Mining Div., Aluminum Corp. of America, Pittsburgh, Pa.

STRATEGIC METALS: S. H. Williston, Vice Pres., Mining Div., Aluminum Corp. of America, Pittsburgh, Pa.

URANIUM: Merritt K. Ruddock, Almar Exploration Co., Moab, Utah.

SPECIAL METALS: Eugene B. Hotchkiss, Vice Pres., Vitro Corp. of America, New York, New York.

OPEN PIT MINING

Chairman: C. D. Michaelson, Gen. Mgr., Western Mg. Divisions, Kennecott Copper Corp., Salt Lake City, Utah.

OPEN PIT MINING AT BUTTE: Edward P. Shea, Geol. in Charge of Butte Operations, The Anaconda Co., Butte, Mont.

CALIFORNIA BORON MINING: Willis H. Wamsley, Mine Supt., Pacific Coast Borax Co., Boron, Calif.

HEALTH AND SAFETY

Chairman: R. R. Williams, Jr., Mgr., Mng. Dept., Colorado Fuel & Iron Corp., Pueblo, Colo.

ORGANIZING FOR SAFETY: Leonard R. Flicker, Safety Engr., Permanente Cement Co., Oakland, Calif.

INCENTIVES: E. C. Leonard, Safety Dir., Inland Steel Co., Ishpeming, Mich.

DUST ELIMINATION: John W. Warren, Chief Ventilation Engr., The Anaconda Co., Butte, Mont.

THURSDAY AFTERNOON, OCTOBER 4

URANIUM IN THE FUTURE

Chairman: P. L. Merritt, Senior Geol., E. J. Longyear Co., New York, New York.

URANIUM AND NUCLEAR ENERGY: Hon. Clinton P. Anderson, U. S. Senator from New Mexico.

FUTURE CONSUMPTION OF URANIUM METAL: Charles H. Weaver, Vice Pres., Westinghouse Electric Corp., Pittsburgh, Pa.

UNDERGROUND MINING

Chairman: Eugene P. Reed, Mgr., Raw Materials, Tennessee Coal & Iron Div., U. S. Steel Corp., Fairfield, Ala.

INDIAN CREEK MINE: Elmer A. Jones, Div. Mgr., St. Joseph Lead Co., Bonne Terre, Mo.

URANIUM SHAFT SINING: Wm. H. Love, Mgr. Mines, Hecla Mining Co., Kellogg, Idaho.

THE KOEPE HOIST: R. G. Schaal, Chief Mech. Engr., Cleveland Cliffs Iron Co., Ishpeming, Mich.

CRYDERMAN MUCKER SHAFT SINING: J. C. O'Donnell, Engr., Shaft and Development Machines Co., Salt Lake City, Utah.

PLANING PHOSPHATE ORE: F. E. Burnet, Supt., Montana Phosphate Products Co., Garrison, Mont. and T. E. Howard, U. S. Bureau of Mines, Spokane, Wash.

THURSDAY AFTERNOON, OCTOBER 4

STRATEGIC MINERALS CONFERENCE

Presiding: S. H. Williston Vice Pres., Cordero Mining Co., Palo Alto, Calif.

Field Trips and Entertainment

Plant tour highlight on Friday, October 5, will be Kaiser Steel's Fontana operation.

Last stop on Friday is Consolidated Rock Product's Irwindale plant . . . a modern sand and gravel operation.

First stop on field trip is Riverside Cement's Crestmore mine . . . see big underground equipment in use.

From Frontierland with cowboys and Indians to Tomorrowland with space ships – Disneyland is a "Magic Kingdom."

Long famous for colorful atmosphere, Olvera Street in Los Angeles recreates the romance of the old Southwest

MINING WORLD present a preview of the Machinery Exposition . . . here are resumes of the equipment and products to be shown at the Los Angeles show. Study them carefully so you won't miss anything.

AERO-COUPLING CORPORATION will feature reusable fittings showing the use of hose assembly, as well as a very high pressure hose with minimum burst pressures up to 20,000 p.s.i. They will also show Aeroquip hose (1), fittings (2), and self-sealing couplings (3). V. deSalvatore will be in charge of the exhibit.

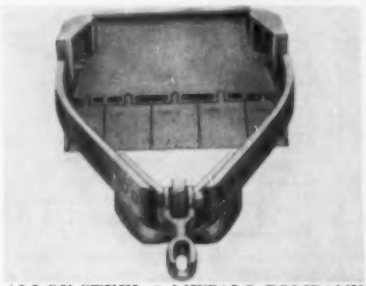
Aero-Coupling ..... Booth 927
Allison Div., G.M.C. ..... Booth 857

AERO SERVICE CORPORATION will show the equipment and methods used in aerial photography, topographic mapping, and airborne geophysical surveys in relation to mining requirements (4). Relief maps of Canada, California, and the World will also be displayed. E. E. Dando will be in charge of the Aero booth.

Aero Service ..... Booth 1026

ALLEGHENY LUDLUM STEEL CORPORATION (Carmet Division) will show a complete display of rock drill blanks (390), rotary blanks (391), core bit blanks (392) and Auger bit blanks (393). Their newly designed "J" style bit (394) with free cutting action, needing only a minimum amount of power at the cutting face, will also be shown.

Allegheny Ludlum Steel .... Booth 1020

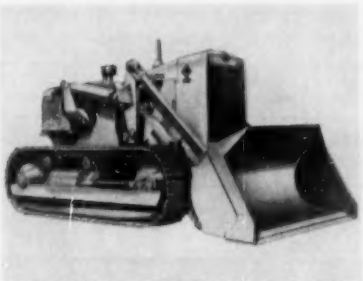


ALLOY STEEL & METALS COMPANY will show the largest and smallest of 14 sizes of Pacific Scrapers (17)—models 2D-84" (18) and 2A-26" (19). Also on exhibit: wide throat and utility sheave blocks (20), the Round-The-Corner Sheave Block (21), and Pacific Sheave Anchors (22). John M. McKean will handle this booth, No. 205.

Alloy Steel & Metals ..... Booth 205

ALLEN-SHERMAN-HOFF PUMP COMPANY will feature the Centriseal pump (5) for abrasive and/or corrosive fluid-solid mixtures. It requires no gland seal water and is totally lined for longer life with easily replaceable parts of rubber or synthetic substitutes. In charge of this booth will be James M. B. Keyser.

Allen-Sherman-Hoff Pump .. Booth 230



ALLIS-CHALMERS MANUFACTURING COMPANY (Tractor Group) will exhibit a Model HD-6G tractor shovel (12), the HD-16 crawler tractor with bulldozer blade (13), the HD-21G tractor shovel and rear-mounted ripper (14), the Model D motor grader with rear end loader (15) and the new Model TR-260 rock wagon (16). V. M. Holloway will supervise.

ALLIS-CHALMERS MANUFACTURING COMPANY (Industries Group) will show scale models of an ACL traveling grate process cement plant (6) and a "Hydrocone" crusher (7). They will also display "Tex-rope" V-belt drive equipment (8), motor scrapers (9) and diesel engines (10) and motor-generator sets (11). R. N. Brown is in charge.

Allis-Chalmers ... Booths 725-729--733-737-824-828-832-836

AMERICAN AIR FILTER COMPANY, INC. will have two dust control units in operation, the Type N (23) and the Amer-Jet (24), along with a mechanical book presentation of the complete line of dust control products (25). John G. Liskow, assistant manager of dust control products, will be on hand to explain the equipment.

American Air Filter ..... Booth 317

> Armchair Information
> You don't have to go the Exposition to get data on any exhibit. Write the number which appears after it on the PEP card in this section and mail to MINING WORLD.

AMERICAN CHAIN & CABLE COMPANY, INC. will display VHS drag lines (26), shovel hoist lines (27), and slusher ropes (28) manufactured for heavy-duty service by the American Cable and Hazard Divisions. They will also show samples of Cable-Laid slings (29) which can be twisted and tied. E. H. Todd, sales manager, will be in charge.

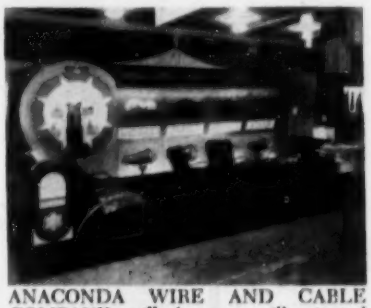
American Chain & Cable .... Booth 115

AMERICAN MANGANESE STEEL DIVISION (American Brake Shoe Co.) will display new semi-automatic processes for hardfacing and repair welding (30), the large renewable lip dipper for the tough digging in mines (31), and new designs and alloys for better service life of ball and rod mills (32). N. N. McGuire heads this booth.

American Manganese Steel .. Booth 511

AMERICAN STEEL FOUNDRIES will show its new Wearpact cast alloy steel (399) now being used extensively in mining operations involving impact and abrasive wear. They will include Wearpact Dipper Teeth (33), Track Shoes (34) and Grousers (35). The exhibit will feature metallurgical characteristics of Wearpact.

American Steel ..... Booth 1012

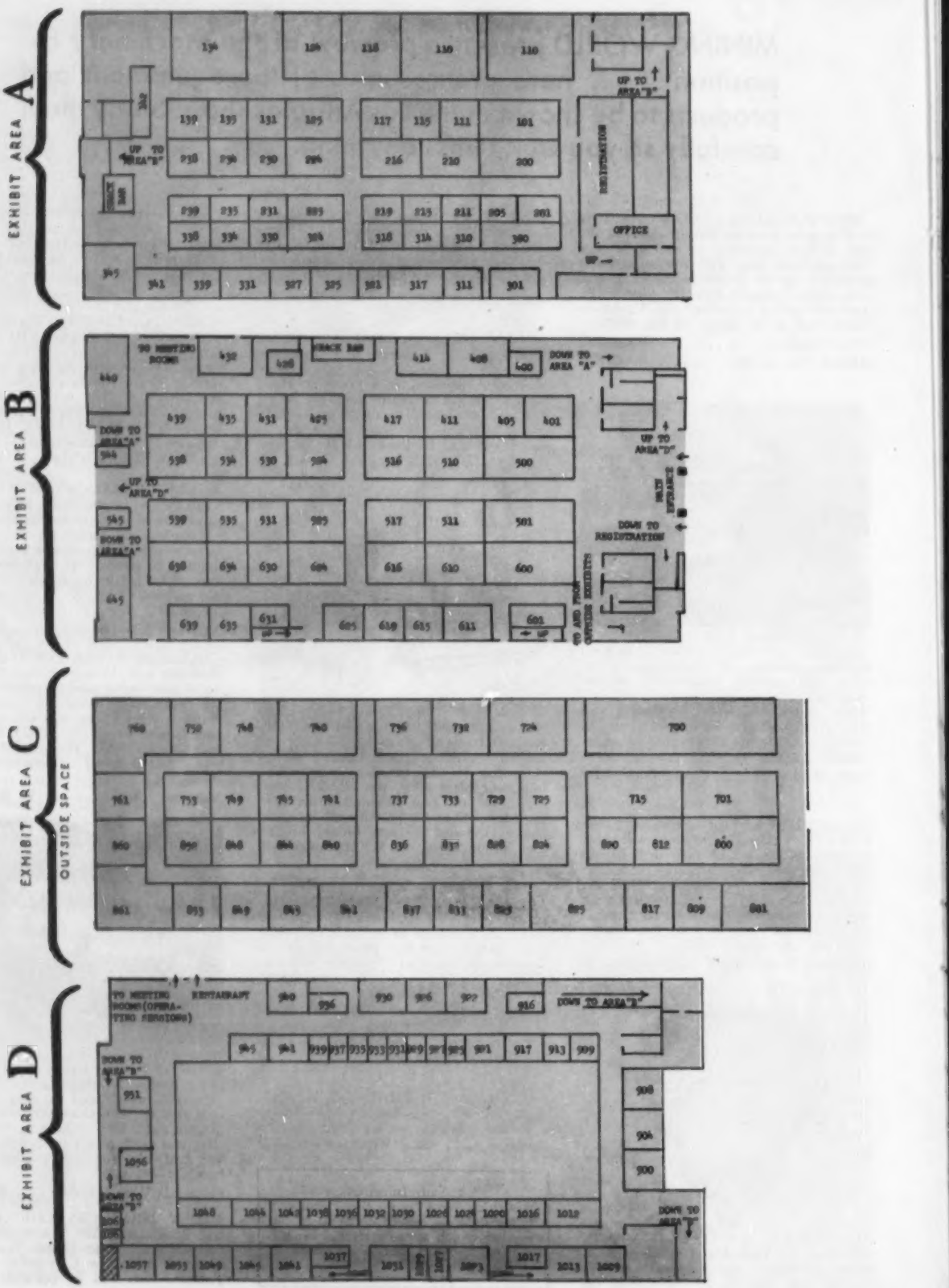


ANACONDA WIRE AND CABLE COMPANY will have an illuminated panel display highlighting its shuttle car cable (36) which uses the new, improved cold rubber. The shovel cable (37), type G mine cable (38), mining machine cable (39), and mine power cable (40) will also be available for examination at the booth.

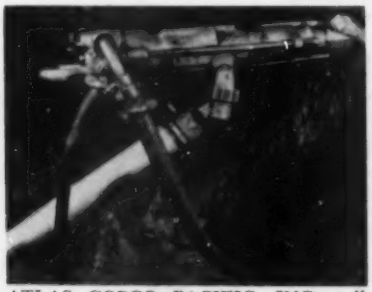
Anaconda Wire & Cable .... Booth 634

ATHEY PRODUCTS CORPORATION will demonstrate the practicality of the Athey PR 21 Rear Dump Trailers (41) as used with the Caterpillar DW 21 Tractor. This will be presented at the

Exhibits — Floor Plan



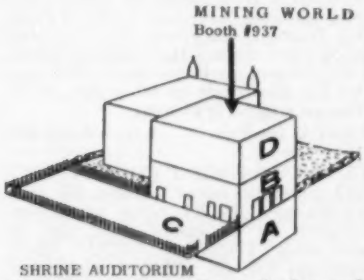
Caterpillar display booth. W. D. Lease, vice president of sales, and A. T. Marchuk, domestic sales manager, will be there to discuss Athey products.



ATLAS COPCO PACIFIC, INC. will make the first U. S. showing of the new Atlas Copco BBC-22 rock drill (42) which incorporates retractable "stinger" in integral pusher leg—acclaimed to increase drilling footage 30 percent per hour. Their international rock and ore collection will also be displayed. W. D. Marshall will be in charge.
Atlas Copco Pacific ..... Booth 224

ATLAS POWDER COMPANY will introduce "Amocore" (43)—a new blasting agent with gelatin core for dependable blasting. Photographic evidence of confinement and control of explosives force with emphasis on proper use of new blasting agents for open pit work will be included. J. H. Dannenburg, advertising manager, will be in charge.
Atlas Powder Co. ..... Booth 951

BALDWIN-LIMA-HAMILTON CORPORATION, manufacturers of LIMA shovels (44), cranes (45), draglines (46), and Austin-Western crushing, screening, and washing equipment (47) will set up large photographs of excavating and crushing equipment under the direction of T. A. Griffin.
Baldwin-Lima-Hamilton .... Booth 1045

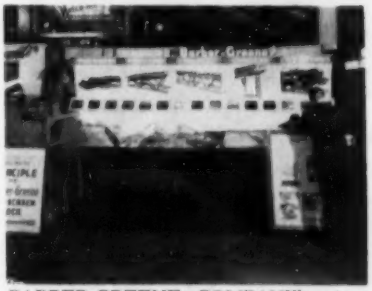


SHRINE AUDITORIUM

MINING WORLD will use a background of exciting action photographs to illustrate worldwide mining methods and operations. Each day in MINING WORLD's Area D Booth #937, guests may choose to guess the number of diamonds (synthetic) that will be placed in a bowl. To each daily winner will go a genuine diamond!
Mining World ..... Booth 937

AUSTIN-WESTERN WORKS, (Construction Equipment Division, Baldwin-Lima-Hamilton Corporation) will introduce two revolutionary new pieces of equipment at the 1956 Mining Show in Los Angeles: the new versatile Austin-Western Hydraulic Crane (340) and the new heavy duty Super 99 6-Wheel Drive and 6-Wheel Steer Power Grader (400).
Austin-Western ..... Booths 741-745

BAND-IT COMPANY will feature its new air tool (413) that accomplishes automatic production clamping at new high speed and efficiency. They will also show Band-It junior clamps (414), bands and buckles (415) and the Scru-Lokt clamping system (416). Other Band-It equipment materials will also be displayed.
Band-It Co. ..... Booth 1030



BARBER-GREENE COMPANY's giant photo murals and color transparencies will illustrate advantages of Standardized Belt Conveyors (48). Stroboscopic light will be used to show the action of Duo-Screen (49) for high-capacity screening of wet, damp or sticky materials. H. W. Newton will be in charge.
Barber-Greene Co. ..... Booth 111

BIXBY-ZIMMER ENGINEERING COMPANY will show the new Bixby-Zimmer Iso Rod Screen (59). A unique cross slot screen installation on operating vibrator will illustrate dewatering application. All types of special Bixby-Zimmer screen surfaces (60) will be displayed. Ray L. Kaga will be in charge of the exhibit.
Bixby-Zimmer ..... Booth 1016

Armchair Information

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BETHLEHEM PACIFIC COAST STEEL CORP. will demonstrate the advantages of steel yieldable arches (50) in supporting heavy ground. They will also show roof bolts (51), wire rope (52), and drill steel (53). W. S. Brisco will manage the exhibit. G. M. Mahood, G. M. Buck, F. T. Saunders and J. L. Humphrey will also be present.
Bethlehem Pacific Steel .... Booth 318

BOSTON WOVEN HOSE & RUBBER CO. will introduce its new line of high tension conveyor belts (417) made by the exclusive BBC (Balanced Belt Construction) manufacturing method. Boston's complete line of conveyor, elevator, transmission and V-belts will also be shown. J. N. Mason will attend the 1956 Show.
Boston Woven Hose ..... Booth 1009

BICO, INC. will make the first presentation of their new sonic-sound actuated heavy media dry concentrator (54) employing the theory of pulsed hindred setteling. They will also demonstrate a complete line of Bico-Braun laboratory equipment (55) including crushers (56), pulverizers (57) and grinders (58).
Bico, Inc. ..... Booth 1029

BOYLES BROS. DRILLING COMPANY LTD. of Canada will feature their new Model BBS-3 Rotary/Core (4,600 ft. capacity) surface diamond drill with self-centering hydraulic chuck and cat-head (61). They will include a sample exhibit of diamond set bits (62). D. R. Montgomery, sales manager, will be in charge.
Boyles Bros. Drilling ..... Booth 638

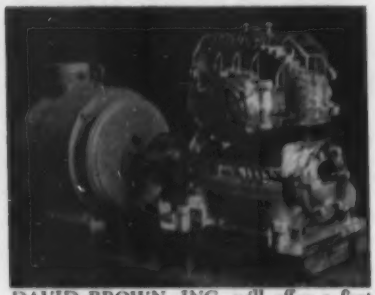
BRODERICK & BASCOM ROPE COMPANY will feature its "Yellow Strand" Powersteel (63), the new, very high strength, Yellow Strand wire rope. Samples of wire rope (64) as well as typical Yellow Strand Braided Safety Slings (65) will be included. J. J. Sieber, sales manager, will be in charge of the exhibit.
Broderick & Bascom Rope .. Booth 235

BRUNNER & LAY, INC. will feature new products from their complete line of carbide bits (66) and drill steel (67) including: 6-inch Rok-Master for I-R Quarrymaster (68); and 6-inch Hole-Master for down-the-hole DrillMaster (69); and other new products (400). W. Schaefer will supervise their exhibit.
Brunner & Lay Rock Bit .... Booth 930

BUCYRUS-ERIE COMPANY will put a scale model of its 150-B 6-yard shovel

(70) in action digging and moving heavy material. Electrically operated by full-scale controls, it will go through all the motions of the actual 150-B. Officials will answer questions on it and other Bucyrus-Erie excavators (71).

Bucyrus-Erie Co. ..... Booth 516



DAVID BROWN, INC. will offer a first look at Radicon speed reducers (402) and some new single reduction Radicons (403). Highlight will be a transparent working model of a RHU Radicon, revealing the Tarus bronze wheel rim and case-hardened steel worm, and automatic lubrication and cooling features.

David Brown, Inc. ..... Booth 1027

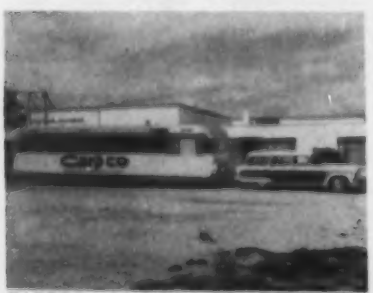
E. D. BULLARD COMPANY, industrial and mining safety equipment manufacturers, will show: Glasfiber, aluminum and esterene Hard Boiled safety hats and caps (72), unit type first aid kits and supplies (73), safety hooks (74), eye and face protection (75), safety clothing (76). Joseph Polizzotto will manage the booth.

E. C. Bullard Co. ..... Booth 1032

C & D BATTERIES, INC. will highlight their "50th Anniversary Exhibit" at the 1956 Mining Show with two higher capacity motive power batteries (77). One model features C & D's new 66 ampere hour cells; the other, the new 125 ampere hour cells (78). Howard Toncray, II will supervise the C & D exhibit.

C & D Batteries ..... Booth 1038

C & D DIVISION, YUBA MANUFACTURING CO. will show their expanded line of C & D Movall Rock-Wagons (79) available for all rubber-tired tractors. Movall capacities range from 12 to 26½ cubic yards struck, with load ratings from 22 to 45 tons. They can be supplied for both new tractors and those in the field.

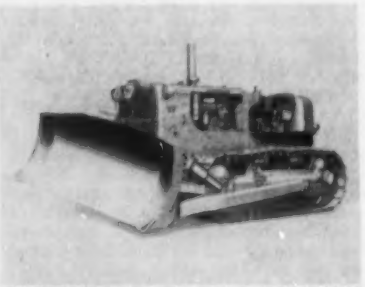


CARPCO MANUFACTURING, INC. will show its Carpco Mobile Laboratory, a complete laboratory service with which their engineers can demonstrate progressive metallurgical technology. Carpco equipment includes Fan Concentrator (82), Wet Shaking Table (83) and High Tension Separators (84). J. Alan West will supervise.

Carpco Manufacturing ..... Booth 861

C. S. CARD IRON WORKS COMPANY of Denver, Colorado, known to mining men throughout the world for custom building of mine cars and other haulage equipment will display operating scale models of mining cars (80) and hoisting skips (81). D. C. Card, president, and R. G. Weaver, sales engineer, will manage the exhibit.

Card Iron Works ..... Booth 428



CATERPILLAR TRACTOR COMPANY will feature the D9 (85) with hydraulically operated tilt-dozer. Also shown for the first time will be a No. 955 Traxcavator front-end shovel (86) with a U. S. Bureau of Mines approved scrubber attachment for underground use. W. J. Bell will supervise the Caterpillar exhibit.

Caterpillar Tractor ..... Booth 700

CHICAGO PNEUMATIC TOOL COMPANY will feature its new self-propelled C-800 Wagon Drill (87), a one-man drilling unit for open pit operations. They will also show hydraulic boom arms (88), stopers (89), core drills (90), airlegs (91), pumps (92), and air tools (93). M. F. Fitzgerald will supervise the demonstration.

Chicago Pneumatic .... Booths 845-849

COAST MANUFACTURING & SUPPLY COMPANY invites visitors to give in to "take five" tendencies at their comfortable booth. Information on safety dust (97), primacord (98) and spittercord (99) will be available. F. W. "Fritz" Nelson will manage the exhibit. R. E. Merritt, J. B. Stoneking and J. A. Merritt will also be there.

Coast Mfg. & Supply ..... Booth 929

CHRISTENSEN DIAMOND PRODUCTS COMPANY is including a display of outstanding cores which have been collected during recent years. The newest core barrel designs (95) and diamond bit designs (96) will also be shown. Field engineers present will answer any coring problems. Alan G. Cooner will be in charge.

Christensen Diamond ..... Booth 1041

CHIKSAN COMPANY will show the 4-inch model of its Intelli-Giant line (94), a hydraulically controlled hydraulicking gun which features one man operation, remote control, high throw capacity, and flow passages with straight solid stream. J. L. Emerson will be in charge. H. I. Dickson and J. L. Emerson will also attend the show.

Chiksan Co. ..... Booth 940

COLORADO FUEL AND IRON CORPORATION invites all visitors to use its Hospitality Center. Comfortable seating, drinking fountain, telephone service, complete secretarial service and Information Center will be available. Use (100) for information on their products. J. R. Smolenske will be in charge.

Colorado Fuel & Iron ..... Booth 440

CRUCIBLE STEEL COMPANY OF AMERICA is including an unusual display featuring "Do's and Don'ts of Drilling Practice." They will also show drill steels (101), Rexwel Hard Surfacing Rods (102), Max-el machinery steels (103), and Hy-Tuf alloy steels for bit bodies. R. W. Persons will be in charge.

Crucible Steel Co. ..... Booth 201

CUMMINGS ENGINE COMPANY, INC. will present its new Cummings PT Fuel System with the PT pump now flange mounted on the engine (350), and its new model Turbodiesel NRTO-6 which develops 335 hp. (351). Cutaways of Turbodiesel engines, along with the VT-12 (352) rated at 600 hp., will also be featured. John Ardington will be in charge.

Cummins Engine Co. ..... Booth 411

DENVER EQUIPMENT COMPANY will demonstrate their new full size Denver Type "M" Flotation Machine (106) that employs dissolved air. They will also demonstrate the Denver Automatic Sampler (107) and Denver Reagent Feeder

Armchair Information

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(108). A display of Denver Rubber-Lined Sand Pumps (109) will be included in their Mining Show exhibit.
Denver Equipment ..... Booth 601

DART TRUCK COMPANY will make the first presentation of Dart's new 35-ton single rear axle truck (104). They will also show their 25-ton single rear axle truck (105), which after many thousand hours of open pit hauling, has an interesting story to tell. F. Marshall, G. F. Dixon, Jr., and W. C. Clayton will attend the Show.
Dart Truck Co. ..... Booths 817-825

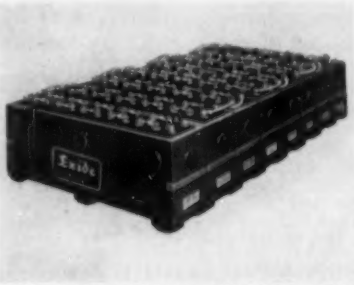
DETROIT DIESEL ENGINE DIVISION, (General Motors Corp.), will show six engines, including models of their new Turbopower units (110), the new Roots-blower 6-110's (111) and the new 1800 RPM generator sets (112). An operating cutaway of their new Turbopower engine will be a special feature. John G. VanHoy will manage the exhibit.
Detroit Diesel Engine .. Booths 431-435-439-530-534-538

DORR-OLIVER INCORPORATED's exhibit will feature graphic applications of Dorr-Oliver equipment (113) to unit operations processing uranium ore in the world's major producing areas. D-O equipped uranium mills will be another feature. Charles M. Comstock, advertising manager, will supervise. T. B. Ford and G. G. Reed will also attend.
Dorr-Oliver Inc. ..... Booth 1053

THE DOW CHEMICAL COMPANY will plan its exhibit around mining chemicals (114), Dow Xanthates (115), flotation frothing agents (116) and Separan and ion exchange resins (117). A large group from Dow will attend the Show including Elmer C. Tveter, chief metallurgist of the Mining Technical Service, Midland, Michigan.
Dow Chemical Co. ..... Booth 339

E. I. DUPONT DE NEMOURS & CO., INC. will emphasize the important part research takes as a means to reducing costs and improving operating efficiencies in the mining industry. Write (118) on the card for du Pont product information. E. L. Thayer, advertising manager, will be in charge of their exhibit.
DuPont Co. ..... Booth 139

EIMCO CORPORATION will show trackless mine-loading equipment (404). The 630 size air-powered bulldozer (405) and air-powered loader (406) for normal and low headroom work will be displayed, along with 105 size equipment: tractor-bulldozer (407), tractor-excavator (408), and tractor-loader units (409).
Eimco Corporation ..... Booth 800



EXIDE INDUSTRIAL DIVISION, (The Electric Storage Battery Company) will show the improved EXIDE-IRONCLAD batteries (341) for use in locomotives, trammers and shuttle cars. Cut-away cells will show what in the construction of their positive plate makes them heavy duty batteries. R. J. Muth will be in charge of the display.
Electric Storage Battery .... Booth 639

ENGINEERS SYNDICATE, LTD. will present its new "Tattle-Tale" (124), an all purpose instrument for ground or airborne use, thorium determinations, drill hole probing, combination scintillation and geiger counting and radio-metric assaying. Its automatic audio alarm, useable at high-speed, gives it versatility.
Engineers Syndicate ..... Booth 325

EQUIPMENT ENGINEERS, INC. will show Krebs Cyclones (125), Krebs Valves (126) and Clarkson Reagent Feeders (127), a product of their Clarkson Company Division, and Model E. Feeder (128) for automatic PH control. Particularly interesting will be a new hydraulically adjustable apex valve for cyclones (129). K. Krebs, president, will attend.
Equipment Engineers ..... Booth 1023

ELECTRIC STEEL FOUNDRY COMPANY will feature ESCO's wear-cap adapter (119) a blue ribbon contribution to the mining industry. They will also show ESCO's triple-tapered dragline buckets (120), shovel dippers (121), teeth (122) and adapters (123). R. W. Topping will manage the exhibit. Ed Hewitt and Gordon Ley will also attend.
Electric Steel Foundry ..... Booth 916

EUCLID DIVISION, (General Motors Corporation), will make the first West Coast showing of the TC-12 Twin Power Crawler Tractor (130). Incorporating two separate trains and 388 HP, it's the world's most powerful crawler. R. E. Keidel, J. W. Bloomquist and A. S. McClimon will attend the 1956 Mining Show.
Euclid Division .... Booths 715-812-820

FAIRCHILD AERIAL SURVEYS, INC.'s display reproduces three types of record that would actually be made in the airplane as it flies over the terrain (part of the display) with its electronic detection equipment: airborne magnetometer (131), scintillation counter (132), and radar altimeter (133). F. W. Hinricks, Chief Geologist, is in charge.
Fairchild Aerial Surveys ... Booth 1037

FLEXIBLE STEEL LACING COMPANY will feature a conveyor carrying 24" belt joined with the newest Flexco Fasteners (137). They will demonstrate the new Flexco Speed Tools (138) and the Rema Conveyor Belt Repair materials (139). M. B. Beach, president, will be in charge of the exhibit. J. P. Ramsey, vice president, will also attend.
Flexible Steel Lacing ..... Booth 239

Armchair Information

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FISHER RESEARCH LABORATORY, INC., will show a complete line of portable geophysical instruments: new completely transistorized geiger counter (134), M-Scope electromagnetic mineral-metal detectors (135), mineralights (136), and featuring a portable refraction-reflection seismic set. G. M. Macleod is in charge.

FISKE BROTHERS REFINING CO. will use moving mechanical units to demonstrate the suitability of Lubriplate lubricants (387) to mining machinery. Other Lubriplate products (388) and containers (389) will also be displayed. H. E. Van Bevers, in charge, will be assisted by Mr. Tiernan and Mr. Bick.

Fiske Brothers ..... Booth 900

THE GALIGHER COMPANY will show their large selection of pumps (140) including the new model 4" x 6" VAC-SEAL Pump (141) with replaceable rubber liners, and the 2½" Galigher Acid-Proof Sump Pump (142). Galigher Metallurgical Engineering Services (143) will also be featured. S. L. Evans, general manager, will be in charge.

Galigher Co. ..... Booth 301

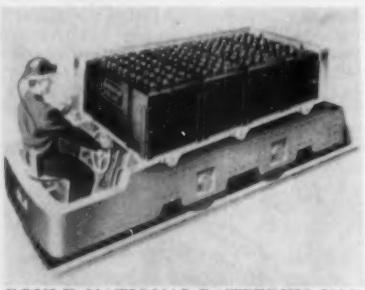
GARDNER-DENVER will show their new heavy-duty 5½" crawler-mounted rock drill model DH143 for open pit and quarry operations (347); their new model RF900DA Rotary Portable Air Compressor with a compressed air capacity of 900 cfm (348); and their unusual hole cleaning WBK dual pressure air compressor (349).

Gardner-Denver Co. ..... Booth 425

General Electric Co. ..... Booth 525

GRIPHOIST INC. will feature their famous portable manually operated cable hoist (397). This lightweight unit weighs only 42 pounds and has unlimited cable travel. When rigged with tackleblocks, the unit will pull or lift over 6 tons. They will also display their line of 8-inch snatch blocks (398).

Griphoist, Inc. ..... Booth 1061



GOULD-NATIONAL BATTERIES, INC. will show the popular 48 cell, 13 plate KLZM type battery (359) for powering the new underground hauling unit as manufactured by Kersey Manufacturing Company. In addition, standard mine type batteries (360) as well as the unique construction of Gould batteries will be on display.

Gould-National Batteries ... Booth 341

HARNISCHFEGER CORPORATION will use a full-scale setup of P & H electronic control for electric shovels (147). They'll also show a model of the Magnetorque—electro-magnetic type clutch (148). Films on the Magnetorque and P & H electronic shovel installations will also be shown. Bernie Germershar-esen will be in charge.

Harnishchfeger ..... Booth 600

HARDINGE COMPANY, INCORPORATED will include a working model of the new Hardinge Disc Roll Mill complete with air classifier and product collector in plexiglass (144), the Hardinge "Auto-Raise" thickener (145), and a glass working model of the Hardinge Tricone Mill showing ball segregation, (146). Frank Lutter is in charge.

Hardinge Company ..... Booth 936

HERB J. HAWTHORNE, INC.'s Doodlebugger display will feature a hand-carved wood model of a six-arm Doodlebug (149), designed to typify the major functions of exploration, and the Hawthorne "Blue Demon" Replaceable Blade Exploration Bits (150), and Type "MP" Bits (151). Earl M. Weaver is in charge.

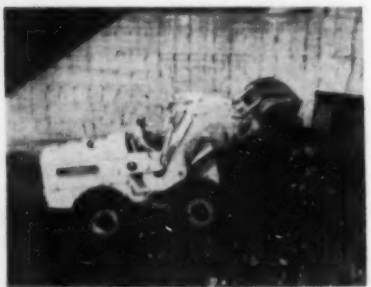
Hawthorne, Herb J. ..... Booth 1044

HERCULES MOTORS CORPORATION will feature their new line of gasoline and diesel engines including their D.D. 339 (152) and G.O. 339 (153) diesel and gasoline 6-cylinder engines. A cutaway engine of the 4-cylinder turbulence-chamber type diesel engine DIX4D (154) will be shown. William Brumback is in charge.

Hercules Motors ..... Booth 234

HEWITT-ROBINS, INC. will show its recently introduced 6x24 foot hi-G vibrating screen (156) that operates on 50 percent less horsepower than conventional screens, yet permits use of larger screens. They'll also show a "Jones" herringbone, gear-type reducer (151). R. U. Jackson will manage the exhibit.

Hewitt-Robins ..... Booth 200



THE FRANK G. HOUGH COMPANY will feature its Model HO "Payloader" four-wheel-drive tractor shovel (353). It's the result of 34 years of pioneering in tractor-shovel design and combines the "Payloader" advantages plus new features that allow it to handle jobs never before

Armchair Information

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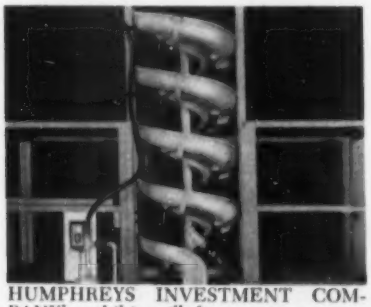
practical for wheel tractor-shovels.
Hough Co. ..... Booth 124

HERCULES POWDER COMPANY will display their wide range of explosives and blasting supplies for the metal mining industries including King size cartridges (155). Representatives of Hercules' Explosives Department in Wilmington and on the West Coast will attend the 1956 Mining Show. George Bossert will be in charge of the exhibit.
Hercules Powder ..... Booth 311

HOMELITE DIVISION (Textron, Inc.) will highlight its display of carryable pumps (158), generators (159), and chain saws (160) with the new Homelite-Bosch heavy duty rock drill (161). This rock drill is electric-motor driven and operates from a 125-pound Homelite generator. Ralph Evans is in charge.
Homelite ..... Booth 1036

HOUSTON TECHNICAL LABORATORIES will exhibit their HR Reflection Seismograph System (162), Gravity Anomaly Simulator (163), Worden Gravity Meter (164), and Resistivity System (165). In charge of the exhibit will be Tom Beard, sales engineer. James L. Williams, sales engineer, will also be attending the show.
Houston Technical Lab. .... Booth 939



HUMPHREYS INVESTMENT COMPANY's exhibit will feature one operating Humphreys spiral concentrator (166) showing the separation of titanium and other heavy minerals from sand in which they occur. Merrill Walker will be in charge of the Humphreys exhibit. James V. Thompson and E. L. Dailey will also attend.
Humphreys Investment Co. .. Booth 327

INGERSOLL-RAND CO.'s display will include new designs in three sizes of the revolutionary Drillmaster Down-the-Hole drill (167). Also to be shown are Carset Jackbits (168), self-propelled hydraulic drill mountings (169), Jackdrills (170), roof bolting equipment (171) and Jackbit Grinders (172). In charge will be T. Slager.
Ingersoll-Rand Co. . Booths 531-535-539

INTERNATIONAL NICKEL COMPANY, INC. will use 8 photographic enlargements to tell the many uses of nickel and nickel alloys in the mining industry. Included in this 1956 Mining Show Exhibit will be the applications in grinding mills (177), liners (178), and pumps (179) and steam shovels (180).
International Nickel ..... Booth 338

INTERNATIONAL HARVESTER COMPANY's display will include an S-120 four-wheel-drive pickup truck (173) and a VF-210 six-wheeler with dump body (174). They will also show a Model 95 Payhauler (175) and a TD-24 crawler tractor (176) with cable bull-grader or bulldozer. J. M. Hannon and H. M. Carlson will be in charge.
International Harvester Booths 100-110-118

JAEGER MACHINE COMPANY will display for the Mining Show its 600 rotary compressor for operating two 4 inch wagon drills (410), a 4PE pump with capacity of 725 GPM at 30 foot towl head (411), and a cutaway of an actual Roto Air compressor (412) showing the action of compressing air in a rotary type compressor.
Jaeger Machine Co. ..... Booth 752

JEFFREY MANUFACTURING CO.'s exhibit will include the electric vibrating Grizzly feeder (181), Flextooth slugger crusher (182), magnetic separator (183), 4 mechanical vibrating conveyors (184), and 2 electric vibrating feeders conveying material in a runabout circuit (185). J. E. M. Wilson vice president of sales, will supervise.
Jeffrey Mfg. Co. ..... Booths 500-510

KENNAMETAL, INC. will feature percussion bits for hard rock drilling (192), sizes from 2¾ to 5 inches. They will also show tungsten carbide balls for ball milling (193), and a complete line of mining tools (194), and rotary drill (195), cutter (196), core (197), and drag bits (198). Among officials attending will be P. M. McKenna, president.
Kennametal Inc. ..... Booth 238

Armchair Information

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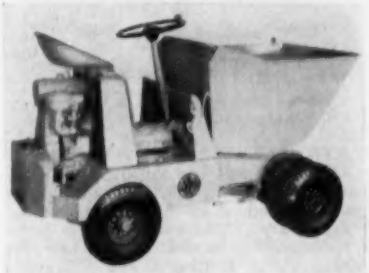
KENWORTH MOTOR TRUCK COMPANY will exhibit two high-capacity, extremely maneuverable rear dump earth-moving trucks (354); Model 802, a 24-ton spring mounted truck of 16-yard struck capacity (355); and Model 803 of 36-ton, 24-yard struck capacity, spring mounted on two axles and standard on tubeless tires (356).
Kenworth Motor Truck .... Booth 760

JOY MANUFACTURING COMPANY, for the first time, will show their new Microdyne dust collector (186), new Limberoller (187) conveyor idler and conveyor belt, "Junior Challenger" drill (188), the first "Push-Button," and the TWM-5 Challenger drill (189). Two new diamond core drills, the No. 25 (190) and No. 22 (191) will be included.
Joy Mfg. Co. . Booths 517-616-625-619-615-724



KOEHRING COMPANY will exhibit its Koehring Dumptor (342) for offroad hauling. It has a 6-cubic yard capacity to handle rock, ore and mine waste. Koehring Company will also display its Kwik-Mix Motor-Bug (343) a material handling and hauling unit. E. J. Goes, J. E. Chadwick and Ray Shell will be attending the Show.
Koehring Co. ..... Booth 833

LOS ANGELES SCIENTIFIC INSTRUMENT CO. will show a complete line of surveying equipment manufactured by

Breithaupt of Germany. A display of unique optical scientific instruments will include optical theodolites (199), optical plummets for sealing and floor centering (200), automatic levels (201), and optical planimeters (202).

Los Angeles Scientific Instrument Co. Booth 913

LE ROI DIVISION (Westinghouse Air Brake Co.) plans to show a new heavy DR-40 wagon drill (203) and new light, compact S-10 stoper (204). One-use CRD bits of all sizes and types available will also be displayed as well as the new S-20 stoper with dust collector (205). Glenn W. Graf will be in charge of this display.

Le Roi Div. ..... Booth 908

LESCHEN WIRE ROPE DIVISION (H. K. Porter & Co., Inc.) will feature an illuminated background of photographic enlargements of both industry and plant pictures. Samples of types, sizes and constructions of wire rope used in mining operations will be displayed as well as Red-Strand wire rope slings (206). L. J. Clarke will supervise.

Leschen Wire Rope ..... Booth 941

LETOURNEAU - WESTINGHOUSE COMPANY will use illustrative demonstration displays which point out machine features and show how they operate. Display equipment includes: 660 motor grader (207), Model C Tournatractor (208), Model B Rear Dump (209), and the new C Fullpak Scraper (210). In charge, Dan Burke and Maurice Hellman.

LeTourneau-Westinghouse . Booths 732-736-740

E. J. LONGYEAR COMPANY will feature a model of the Longyear Wire Line (215) and other core barrels (216) to illustrate importance of good core recovery. Longyear consulting services and the use of photogeology will be an important part of the exhibit. Harry A. Kurtz will be in charge. R. D. Longyear will also attend.

Longyear Co. ..... Booth 432

LINK BELT COMPANY will highlight their exhibit with a model of a 275-ft. radius belt conveyor stacker (211) being installed to stockpile taconite pellets at the new Erie Mining Company plant. They will also show belt conveyor idlers (212), a parallel shaft gear reducer (213), and allied power transmission products (214).

Link-Belt Co. ..... Booth 331

LUDLOW-SAYLOR WIRE CLOTH COMPANY will show samples of Abrasion-Resistant Super-Loy (217) and Ludloy Woven Wire Screens (218) and Wire Cloth (219), including a wide variety of square screen openings and long openings, in various wire diameters up to 1-inch thick Super-Loy bars (220). Ernest S. Robson will attend.

Ludlow-Saylor Wire Cloth .. Booth 935

LUKENS STEEL COMPANY will display their clad and alloy steels (357) for materials handling and process equipment in the mining industry. The use of Lukens "T-1" steel (358), a quenched and tempered high strength alloy for resistance to impact and abrasion, will be emphasized by interesting on-the-job performance data.

Lukens Steel Co. ..... Booth 1049

MANHATTAN RUBBER DIVISION, (Raybestos-Manhattan, Inc.), will feature its new Poly-V Drive, a new type belt with specially designed pulleys to mate with the ribs in the belt (227). They will also show new conveyor belt developments (228) made with super-strength synthetic fibres. A. L. Hawk and S. F. Hoffman will be in charge.

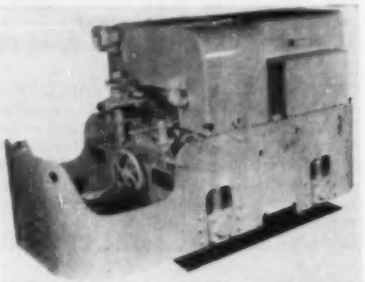
Raybestos-Manhattan ..... Booth 310

MACK TRUCKS, INC.: Feature equipment will be a Model LRVSW six-wheeled chassis (221) of 68,000 pounds payload capacity, equipped with a Heil 24-yard rock body (222) and hoist (223) and operating component units. The bogie of the truck will be arranged to operate. Merrill C. Horine will be in charge.

Mack Trucks, Inc. ..... Booth 134

MARION POWER SHOVEL COMPANY will feature their new 35-M, ¾-yard truck crane (229) from their complete line of power cranes and shovels (230). Designed for general utility work around any type of mining operation, it's convertible from crane to clamshell, shovel, or hoe operation. H. E. Bonecutter will handle this exhibit.

Marion Power Shovel .. Booths 761-860



MANCHA STORAGE BATTERY LOCOMOTIVE DIVISION, (Goodman Manufacturing Company), will feature three mine locomotives: a 1½ ton storage battery unit for tramming (224), a 6 ton storage battery unit for heavy hauls (225), and a 2 ton diesel unit with removable cab for small shafts (226). C. M. Graham will be in charge.

Goodman Mfg. Co. ..... Booth 524

Mine Safety Appliances .... Booth 624

Mobile Drillings ..... Booths 749-848

MORAN INSTRUMENT CORPORATION will show new models of: the Gamma Logger (361), a complete motor-driven scintillation counter logging unit; the Airborne Scintillation counter (362), a sensitive recording instrument for aerial and automatic gamma ray surveys; and their Electronic Survey equipment (363).

Moran Engineering Co. .... Booth 345

MULTI-METAL WIRE CLOTH COMPANY, INC. will exhibit all types of metallic filter media (231) and screens (232), filter leaves (233) and tubular filter elements (standard and custom designed) (234), and related materials used in filtering and screening operations. R. A. Stern and D. A. Sayles will attend the Show.

Multi-Metal Wire Cloth .... Booth 909

THE NATIONAL SUPPLY COMPANY will exhibit a full-sized, cut-away operating model of its new heavy duty torque converter (364). The model is one of six basic sizes of National's single-stage torque converters which provide 17 power capacities between 100 and 1000

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horsepower for matching mining machinery motors.

National Supply Co. ..... Booth 231

NATIONAL FILTER MEDIA CORPORATION, Western Division, will show over 300 samples of filter fabrics and filter paper (235). Special feature will be its newest multipurpose monofilment filter media, POLYMAX (236). Included too, will be newest design fabricated filter covers and dust collector bags (237). R. V. Haedt will be in charge.

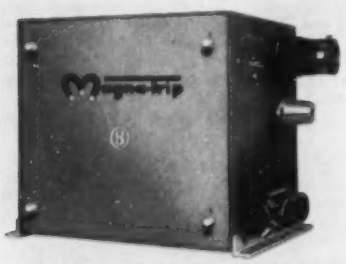
National Filter Media ..... Booth 1042

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY will show the newest railroad coupler, the Type F Interlocking coupler (238). H. H. Smith, manager of the mine and mills sales department, in charge of the exhibit, will be assisted by J. F. Thomas, sales manager of the Capitol Foundry Division.

National Malleable ..... Booth 417

NORDBERG MANUFACTURING CO. will feature the Symon's R line of gyratory and cone crushers (239). Highlighting the display will be operating scale models of the Symons Cone Crusher (240), V-Screen (241), Vibrating Bar Grizzly (242), Horizontal Type "F" Screen (243), and the Rod Deck Screen (244). R. E. Schulz will manage the exhibit.

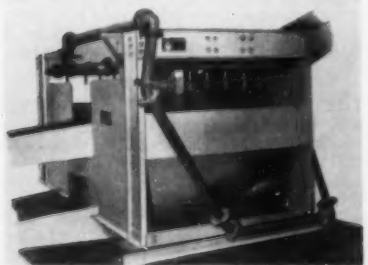
Nordberg Mfg. Co. ..... Booth 219



OHIO BRASS COMPANY will exhibit the O-B Magna-Trip Circuit Interrupter (245), complete display of overhead trolley wire fittings (246), aluminum and copper feeder cable fittings (247), rail bonds (248), and collectors for locomotives (249). Fused taps and rail clamps (250), expansion shells (251), and plugs for roof bolting will also be shown.

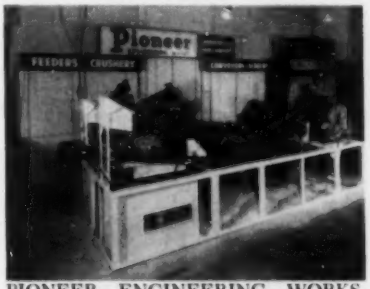
Ohio Brass Co. ..... Booth 917

Olin Mathieson Chemical ... Booth 210



ORE & CHEMICAL CORPORATION will feature a working model of their Heavy Media Separatory vessel (252) recently introduced. Five models are available in capacities up to 400 tph, capable of handling all HMS applications. A laboratory size unit with a capacity of 1000 lbs. per hour is also available. Paul C. Cayard, is in charge.

Ore & Chemical Corp. ..... Booth 401



PIONEER ENGINEERING WORKS, INC. will exhibit an authentic one-fourth scale model ore and aggregate crushing, screening and sizing plant. Material will actually be crushed and sized by this model which has a heavy duty feeder, jaw crusher, triple roll crusher, two vibrating screens and conveyors (253). W. A. Rundquist is in charge.

Pioneer Engineering ..... Booth 841

PRODUCTIVE EQUIPMENT CORPORATION will show a two-deck open type base mounted Gyroset screen (254) for use on sizing, wet or dry, and dewatering. The Gyroset is a positive eccentric two-bearing screen having the eccentricity adjustable in eight settings from O to ¾". L. H. Leman, sales manager, will supervise the exhibit.

Productive Equipment ..... Booth 544

QUAKER RUBBER DIVISION, (H. K. Porter Company, Inc.) will feature samples and photographs of various conveyor belt applications in the mining field (255). A conveyor belt model, a model of an actual Quaker installation, will be operating continuously during the show. H. A. Wiley, Jr. will manage the exhibit.

Quaker Pioneer Rubber .... Booth 1031

Armchair Information

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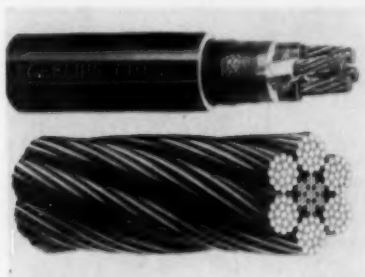
REICH BROTHERS MANUFACTURING COMPANY, INC., will display a model 400 truck mounted prospecting drill with both air and water circulation and infinitely variable rotation speeds (256). Information on the complete line of rotary drills (257), truck and crawler mounted, will be on hand. W. L. Reich, president, will supervise.

Reich Bros. ..... Booth 801



JOHN A. ROEBLING'S SONS CORPORATION (subsidiary of the Colorado Fuel and Iron Corporation) will feature its new Royal Blue Wire Rope for all wire rope requirements from underground to surface (344). Roebling's P3BM Multiple Conductor Electrical cable for industrial, mining and utility requirements (401) will also be shown.

Roebling's Sons Corp. ..... Booth 611

ROME CABLE CORPORATION will display Rome 60 neoprene sheathed portable mining cables (258) with emphasis placed on trailing types for power feed to mobile equipment. An interesting feature will be the testing of a twin conductor shuttle car cable for flexibility under tension. Dwight H. Thayer will be in charge.

Rome Cable Corp. ..... Booth 926

SHARPLES CORPORATION will exhibit its new high-efficiency dry powder classifier, the Sharples Super Classifier (418). It is the first dry powder classifier to successfully combine cutpoint sharpness and high efficiency with high capacity. They will also show two centrifugal wet classifiers (419) at the Mining Show.

Sharples Corp. ..... Booth 837

SHEFFIELD STEEL DIVISION (Armco Steel Corporation) will feature their

Sheffield Moly-Cop Grinding balls (338). Samples of the progress steps in the forging operations and a Tel-A-Story projector illustrating the various manufacturing processes from the making of special analysis steel to the finished balls.

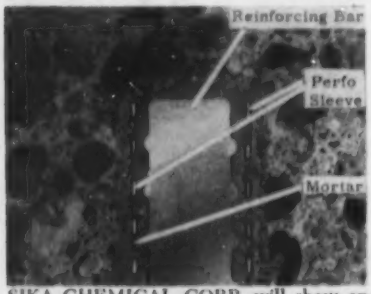
Sheffield Steel ..... Booth 931

SANFORD-DAY IRON WORKS, INC. will show the newest model Gismo mucking and transporting machine (259), as well as the drop-bottom ramp car (260) used in connection with tunnel driving. A small working model of drop-bottom cars operating over tripper and closer will also be shown. W. D. Moreman will be in charge.

Sanford-Day Iron Works .... Booth 701
St. Regis Paper ..... Booth 225

SIMPLEX WIRE & CABLE CO. will inform and entertain with an effective showing of the applications of their products (264) in 20 fields of the mining industry with wire sculpture displays. In addition, they will show a comprehensive range of Anydrex and Tirex samples (265) in the 1956 Mining Show.

Simplex Wire & Cable .... Booth 1048



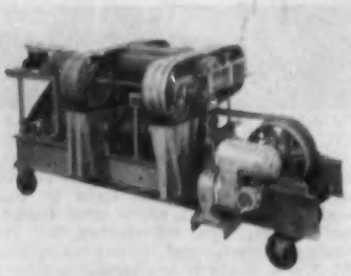
SIKA CHEMICAL CORP. will show an actual installation of the Perfo Bolt System (261), a grouted type roof bolt. Plastiment (262), a concrete densifier, will be displayed as well as retarding, accelerating and expanding compounds (263) used in concrete and grout for sealing, grouting and guniting. J. F. Artuso will supervise.

Sika Chemical Corp. ..... Booth 1057
Southwestern Engineering .. Booth 610
Spencer Chemical ..... Booth 438

STANCO MFGS. & SALES, INC. will display the 66 pound and 86 pound portable, gasoline-engine powered Pionjar Combination Rock Drills and Breakers (266), the full line of Flygt Submersible Electric Dewatering Pumps (267), the line of X-Ray Diamond Drills (268), and SKF Swedish Drill Steel (269). Grant Nielson will be in charge.

STEPHENS-ADAMSON MFG. CO. will show belt conveyor components (271) used to equip large ore handling installations including: belt carriers (272), pulleys (273), Sealmaster ball bearing pillow blocks (274), Rollery Type Holdback units (275) and Spring Type Belt Cleaners (276). W. Cousland will be in charge.

Stephens-Adamson ..... Booth 904



STEARNS MAGNETIC, INC. will show an operating unit of a "WPD" Wet Permanent Drum Separator (270). This specially designed separator has a deep powerful magnetic field that provides correct flux distribution for positive transport of the collected magnetic to the discharge point. W. J. Bronkala, division sales manager will be in charge.

Stearns Magnetic ..... Booth 131

STOODY COMPANY is planning actual demonstrations of hard-facing processes applicable to maintenance of mining equipment. They will include a display of hardfaced mining equipment (277). A. W. Anderson will be in charge. G. F. Staley, R. A. Hand, R. Jenkins, H. S. Warren, K. G. Carter, and G. E. Rogers will also attend.

Stoody Co. ..... Booth 645

STRATOFLEX, INC. will show its permanent traveling display of detachable, reusable hose (420) and fittings (421). W. D. Rothell will be in charge of the Stratoflex 1956 Mining Show exhibit at Los Angeles. C. A. Thomas, general manager of sales, will also attend the Show.

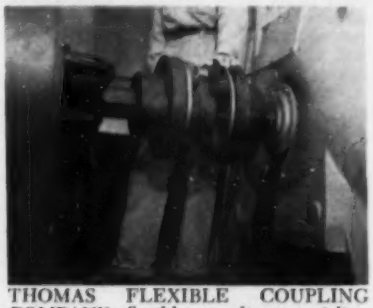
Stratoflex, Inc. ..... Booth 405

THOR POWER TOOL CO. will display drifter, stoper and sinker rock drills (279), jumbo drilling machines (280), air columns (281), stoper, raiser and sinker legs (282), push feed drills (283), wagon drills (284), sump pumps (285), couplings (286) and bits (287). J. F. Corkery will be in charge. B. H. Johns and W. A. Nugent will also attend.

Thor Power Tool ..... Booth 300

TIMKEN ROLLER BEARING COMPANY will feature a model of the Timken tapered socket bit (288), the newest addition to their well-known line of carbide insert and multi-use bits (289). Timken bearings (290) and parts (291) for mine cars will also be shown. S. T. Salavage will manage their exhibit for the 1956 Show.

Timken Roller Bearing ..... Booth 635

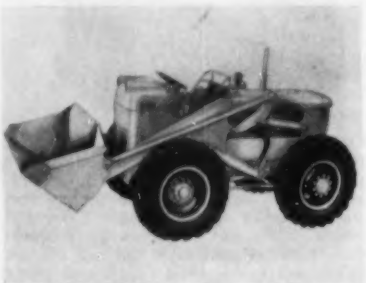


THOMAS FLEXIBLE COUPLING COMPANY, flexible coupling specialists for 40 years, will exhibit Thomas Flexible couplings (278). Each connected machine runs freely in its own bearings with no cross strain or end thrust transmitted to the other. Fred L. Donovan, sales manager, Warren, Pa., will attend the Show.

Thomas Fexible Coupling .. Booth 545

TOOL STEEL GEAR AND PINION COMPANY will display cutaway sections of various types of materials for the mining industry. Photographs of installations where "Tool Steel" parts (292) are used in the mining industry, will be shown. J. C. Seeger, general sales manager, will be in charge. C. R. Burrel will also attend.

Tool Steel Gear & Pinion ... Booth 400



TRACTOMOTIVE CORP. will display their TL-12 Tracto-Loader (293), a 4-wheel drive excavator-loader with a 1¾ cubic yard tip-back bucket; and TL-10 Tracto-Loader (294), a 1-cubic yard front wheel drive loader. Both have hydraulic torque convertor drive and clutch-type transmission. N. K. Rasmussen will supervise.

TRAYLOR ENGINEERING & MFG CO. will show photos of kilns (295), jaw crushers (296), TY reduction crushers (297), feeders and TC gyratory crushers (298). C. H. Roberts, vice president, will supervise the exhibit. A. C. Most, Jr., sales manager, Crusher Division and C. W. Spears, engineer, will also be at the 1956 Mining Show.

Traylor Engineering ..... Booth 922

W. S. TYLER COMPANY will feature the newest model Ty-Rock Screen (5' x 12') (304). Samples of woven wire screens (305) of many different metals and meshes will be shown. A Ro-Tap testing

Armchair Information

You don't have to go the Exposition to get data on any exhibit. Write the number which appears after it on the PEP card in this section and mail to MINING WORLD.

sieve shaker (306) and Tyler standard screen scale testing sieves (307) will complete the Tyler exhibit. Fred Braun is in charge.
The W. S. Tyler Co. ..... Booth 211

TWIN DISC CLUTCH COMPANY will display their torque converters (299), Model PO air clutches (300), Model EH friction clutches with rubber block drive (301), friction power take-offs (302), Model CL friction clutches (303), and fluid couplings. Art Belcher, W. B. Gibson, J. N. Yetter and Pierce Tyrell will attend.
Twin Disc Clutch Co. ..... Booth 309

Ultra-Violet Products ..... Booth 142

Union Wire Rope ..... Booth 215

UNITED STATES RUBBER COMPANY will show extensive selections of conveyor belts (365), transmission belts (366), hose (367), Uscolite, a corrosion-resisting rigid piping made of thermoplastic material (368) as well as fittings (369) and valves (370) and packings (371), rod packing (372) and tape (373).
United States Rubber ..... Booth 125

U. S. Steel ..... Booths 408-414

VASCOLOY-RAMET CORPORATION, manufacturers of cemented carbide mining bits (345), will exhibit a complete line of carbide percussion bits (346). Show visitors will be able to see the three basic types of percussion bits: for Shoulder Drive Rods, for Bottoming Drive Rods and for Push-on Rods. R. O. Moore will attend.
Vascoloy-Ramet ..... Booth 334

UNIVERSAL ENGINEERING CORPORATION will feature a portable demonstration model of their 1956 "Blue Ribbon" award winner, Wobbler Feeder (308). Its combination feeder-scaler removes fines from oversize without blanking even in wet, sticking materials. Among officials attending will be H. K. Knudten, president.
Universal Eng. ..... Booths 753-852

Varel Mfg. Co. ..... Booth 1024

VICTAULIC COMPANY OF AMERICA will show its complete Victaulic Method of Piping (309) including couplings (310) for every piping job. They will show a new method of joining thin wall pipe and tubing, the "Victaulic Wheel-Ezy Method of Piping" (311). R. W. English, J. E. St. Clair, H. Dave Squibb, and W. Van Meurs will attend.
Victaulic Co. ..... Booth 661

VULCAN IRON WORKS COMPANY will display several slushers (312), scrapers (313), and miscellaneous small items (314). They are planning to provide excellent seating accommodations with free local telephone service. C. N. Chase, general manager, and J. N. Jett, sales engineer, will be attending the 1956 Mining Show.
Vulcan Iron Works ..... Booth 748

Armchair Information

You don't have to go to the Exposition to get data on any exhibit. Write the number which appears after it on the PEP card in this section and mail to Mining World.

WEDGE-WIRE CORPORATION will show their "Kleenslot" Wedge Wire preparation Screens (339) for dewatering, screening, washing, extracting, filtering or sizing applications. "Kleenslot" Wedge Wire Screens can be furnished in practically any type of metal. Joseph E. Parker will be in charge of the booth.
Wedge Wire Corp. ..... Booth 921

WESTERN GEAR CORPORATION will show speed reducers, right angle, vertical and parallel shaft types (315), speed increasers (316), torque convertors (317), torq-master transmissions (318), gear motors (319), couplings (320) and gears. Ray Conlisk, Robert Ritzel, Gene Bennett, and James Sullivan will attend the Show.
Western Gear Corp. ..... Booth 135

WESTERN MACHINERY COMPANY will display a 1955 Blue Ribbon winner, 5' x 11' Wemco Remer Jig (321); also 44" Wemco Fagergren Flotation Machine (322). The Western Knapp Engineering Division personnel will be on hand to describe their variety of services. W. F. Haddon will be in charge of the exhibit.
Western Machinery Co. .... Booth 101

WESTERN PRECIPITATION CORPORATION's exhibit will include their new automatic voltage control (323), developed to maintain optimum voltage input to Cottrell Precipitators (324) to match changing operating conditions.

Fill in numbers and mail this card for literature on products discussed in this issue.

To get further information on any item described in the Production Equipment Preview, note the key number of that item, write in the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

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Please send me literature on products displayed at Metal Mining Show or described in regular PEP Section as indicated by numbers below.

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E. R. Johnson will be in charge. R. F. Stewart, E. F. Petrus, and W. L. Penick will be attending the Show.

Western Precipitation ..... Booth 216

WESTERN ROCK BIT MANUFACTURING CO. will feature the new "used to destruction" no resharpening Liddicoat tungsten carbide bit (325). It's low in cost and designed for fast cutting action, ease of collaring and removal from drill hole. M. W. Hawkesworth will be in charge. H. Siegal, T. C. Bennett and L. B. Birch will attend.

Western Rock Bit ..... Booth 314

WESTINGHOUSE ELECTRIC CORPORATION will show an animated model of an atomic power plant they have built and are building. They will also display motors (326) and controls (327) gearing (328) and other electrical apparatus (329) for mining use. Donald Elkner will be in charge. Rex Anderson and E. E. Lacy will be present.

Westinghouse Electric ..... Booth 501

WHEELABRATOR CORPORATION will display Wheelabrator Dustube cloth-filter-type collectors (330) and their use in dust and fume control in the mining and metallurgical industries. Collection efficiency is above 99 percent. L. L. Andrus will supervise the exhibit. R. T. Pring and R. L. Orth will also attend the Show.

Wheelabrator ..... Booth 1056

WHITNEY CHAIN COMPANY will show its line of Universal Joint Mine Chain (331) for all types of loaders and continuous miners. A complete line of American Standard Precision Steel Power Transmission and Conveyor Chain (332) will also be exhibited. A. J. Swisler will be in charge. W. O. R. Korder will also attend the Show.

Whitney Chain ..... Booth 1063

WINTER-WEISS CO. will show photographs and motion pictures of various models of the Portadrill rotary drilling equipment (337) for exploration, mining blast holes and other vertical hole applications. H. A. Winter, Jr., will manage the exhibit. O. D. Colquitt and R. J. McGann will also be at the Mining Show.

Winter-Weiss ..... Booth 321

White Motor ..... Booths 840-844

Armchair Information

You don't have to go to the Exposition to get data on any exhibit. Write the number which appears after it on the PEP card in this section and mail to MINING WORLD.

WILD HEERBRUGG INSTRUMENTS, INC. will introduce the new T-16 Transit with direct readings to 1' (333). Designed especially for mining use, the T-16 has a repeating clamp, built-in optical plummet with up-right image and can be equipped with mining attachments. H. F. Tanner, treasurer, will be in charge.

Wild Heerbrugg Inst. ..... Booth 933

WILLYS MOTORS, INC. will feature a CJ-5 "jeep" showing the "jeep" family in various uses in natural resources. The "jeep," (334), jeep truck (335) and the jeep utility wagon (336) are used in all types of mining operations where 4-wheel drive is the answer to fast, economical job completion. Stan Ford is in charge.

Willys Motors ..... Booth 119

Worthington Corp. ..... Booth 853

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PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

S. F. Helicopter Service Lifts Exploration Load

Relatively new in the field of detailed airborne exploration is the Rick Helicopter Service in San Francisco. With a present fleet of 28 helicopters, the Rick organization is finding much of its time and equipment devoted to the mining industry. Helicopters have proven themselves to be very useful and economical in detailed, comprehensive, airborne mapping and exploration. They are invaluable also in transporting equipment to remote and otherwise inaccessible areas.

Rick Helicopters maintains complete operational bases, both in San Francisco and Anchorage Alaska. They are equipped to fly anywhere in the world at relatively short notice. For further information on this flying service circle No. 502.

Hycon Starts Helicopter-Geophysical Service

A new combination of airborne equipment has been inaugurated by Hycon Aerial Surveys. Combined magnetometer, electromagnetometer and scintillometer surveys are to be flown by helicopters. According to the company the utilization of all three instruments in the helicopter will enable Hycon to make detailed surveys over areas too small to be economically flown by fixed-wing aircraft, also the helicopter may be flown at low altitudes over rough ground which would prove difficult for conventional planes.

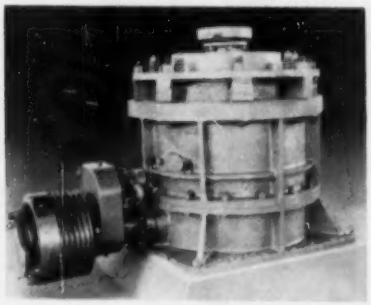
The electromagnetic system is installed in a 20-foot bird which is trailed on a 100-foot cable within 50 feet of the ground. The "bird" is made of doped cloth and fiberglass. For further information circle No. 501.

Self-Contained Drill Added To Copco Line

A completely self-contained drill so lightweight and compact in design it is readily carried in any terrain by one man, has been added to the wide range of drilling tools available through firms of the Atlas Copco group throughout the world.

"Cobra," as the new drill has been designated, has a total weight of only 53 pounds. Equipped with Sandvik Coromant steels, the unit will drill up to 26 feet an hour, and to depths of 13 feet. Operational average is 100 drilling feet per gallon of gas.

The one-cylinder, double-stroke, free-wheeling motor has a pull type starter, and a floatless carburetor that permits inclined drilling positions up to 45°. An integral compressor provides 100 percent air flushing of drilling mechanism channels. Job site demonstrations are available. Circle No. 503 for further information.



Straub Develops New 28 Inch Gyratory Crusher

The Straub Manufacturing Co., Inc., of Oakland, California has recently developed a new model gyratory fine reduction crusher. The Kue-Ken crusher, designated as a 28-inch size, is available with fine, medium, and coarse bowl liners to suit different feed sizes and products. Receiving openings range from 1¾-inches to 3¾-inches, while discharge settings range from ¼-inch to 1¾-inches.

With a capacity from 10 to 75 tons per hour, the crusher features extremely low headroom, choke feeding and the well known Kue-Ken feature of "crushing without rubbing." For further information circle No. 504.

Hyster Company to Build Peoria Factory Addition

Hyster Company, tractor equipment and industrial truck manufacturer, is erecting a $150,000 factory addition in Peoria, Illinois. Construction will be completed in November and will add about 25,000 square feet to present plant facilities.

The Hyster Peoria factory produces tractor winches, excavator cranes, and many other lines of equipment designed for matched performance with Caterpillar-built tractors. A self-propelled 10,000 pound capacity yard crane, the Hyster "Karry Krane," is also manufactured there.

All Hydraulic Powered Drilling Unit

Newest unit in the extensive Mobile Drilling line is this hydraulically powered drill, designated Mobile Drill Model B-40. Engineered to operate as a core or auger drill, the B-40 may be adapted for tractors and vehicles or independently driven by a motor mounted at the rear of any vehicle. For hard formations, either air or water may be used with hollow-stem augers. The drill cores to 200 feet and augers to 75 feet as tested by the factory. A powerful 15-hp hydraulic motor is geared to high torque and low speeds, and assures a positive, steady drill action. Circle No. 507.

Man Conquers Heat 1/8th As Hot As Sun

A suit that enables a man to work in temperatures one-eighth as hot as the sun's surface was demonstrated in New York recently.

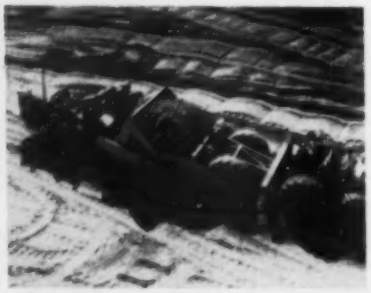
The demonstrator six times entered an industrial furnace heated to 1,200° Fahrenheit, the highest temperature ever entered publicly for more than a few seconds. He stayed two or three minutes each time as if on a repair or rescue mission.

The demonstration—sponsored by Minnesota Mining and Manufacturing Company, was held to show the heat-protective qualities of fabrics coated with a thin layer of aluminum, a process developed by 3M. The Aluminum-coated fabric reflects radiant heat instead of insulating against it. Circle No. 505 for further information on this extremely useful fabric.

Scoot-Crete Ore Carriers Versatile and Powerful

The versatile and powerful "Scoot-Crete" ore carriers, in a variety of sizes may be found at work in innumerable mining operations. These ore carriers are ideally suited for trackless mining operations as they operate without rails, ties, or external power sources. Produced by Getman Brothers, the units are powered with scrubber-equipped Deutz Diesel engines for underground use.

Newest and largest "Scoot-Crete" ore carrier is Model CD-3, which has a load-carrying capacity of 10,000 pounds, and a 144-inch turning radius. Smaller models have load capacities of 14, 16, 20, and 27 cubic feet. Circle No. 506 for further information.

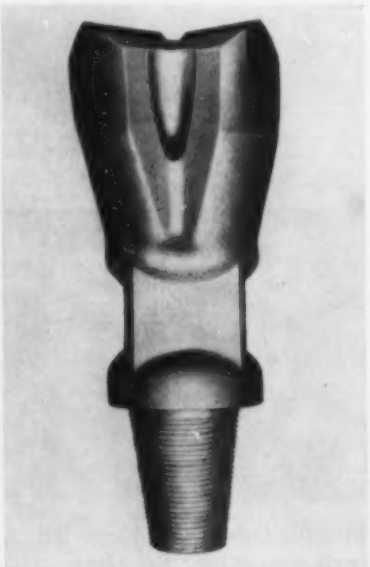


New Fast-Loading Scraper By LeT-Westinghouse Co.

A new 18-cubic-yard scraper has been announced by LeTourneau-Westinghouse Company. Designated the Model C Fullpak scraper, the unit was named for its ability to get packed, high volume loads of low void content.

According to the engineers who designed it, the Fullpak embodies all the dependability of earlier models in a new design which is the result of more than two years of exhaustive field studies to determine equipment owners' needs and desires.

For faster loading, better boiling, and larger loads, the new Fullpak scraper is built wider and lower than the company's previous Model C scraper. Despite this and its correspondingly lower center of gravity, the new machine actually has greater ground clearance than its predecessor. Circle No. 508 for further information.



Brunner & Lay Adds 6-in. Rok-Master Bit to Line

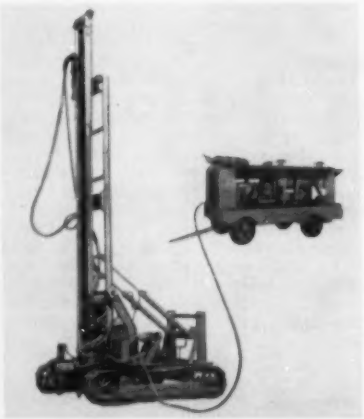
The addition of a 6-inch Rok-Master bit to its line of percussion rock drill bits has been announced by Brunner & Lay Rock Bit Corp. Designed for use on the Ingersoll-Rand Quarrymaster drill, the bit features 2 x 3 A. P. I. threads, and a super-tough bit body.

The carbide inserts have unusual resistance to wear and shock according to the manufacturer. For further information circle No. 510.

Three Industrial Films On Diamonds Available

Three industrial films are now available at no cost, from Christensen Diamond Products Company, P.O. Box 387, Salt Lake City 10, Utah. Offered for showings at association meetings or conventions, these 16 mm color films with sound average 25 minutes in length.

The first film deals with diamond production in South Africa, and shows how diamonds are recovered from the famous Kimberly Mine and from alluvial deposits. Film number two, shows the steps involved in the manufacturing of diamond bits and core barrels at the Christensen plant. The application of diamond products in the petroleum, mining, and construction industries is shown in the third film. Address your requests to the company, or circle No. 500.



Gardner-Denver Announce Heavy-Duty Rock Busters

Gardner-Denver Company has just announced two pieces of heavy-duty equipment for contractors, rock quarries, and open pit mines. One is the Rotary 900 Portable Compressor that delivers 900 cfm, the other is a 5¾-inch percussion rock drill that introduces an entirely new rock drill class.

The Gardner-Denver Rotary 900 Portable Compressor is similar in design to the Gardner-Denver Rotary 600 which has been serving on all types of work. It is a two-stage compressor with normal operating pressure of 100 psi. The design is simple, and all parts of the machine can easily be inspected and maintained in the field.

The Gardner-Denver Model DH143 5¾-inch Rock Drill is similar in design with the 4½-inch drill announced last year. This new and larger drill has a 5¾-inch hammer diameter, and provides extra power for handling large size bits (3⅝-to 5 inch), and for fast penetration in hard rock. The drill may be crawler or tractor mounted. Circle No. 509 for further information.

U.S.A. Metal & Mineral Prices

METALS

August 17, 1956

COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	40.00¢
	Lake. Delivered, destinations, U.S.A.	40.00¢
	Foreign Copper, Valley basis	40.00¢
LEAD:	**Common Grade.** New York	16.00¢
ZINC:	**Tri-State Concentrates,** jig, flotation 80% lead, per ton	$201.32
	Prime Western: F.o.b. E. St. Louis	13.50¢
	Prime Western; Delivered, New York	14.00¢
	Tri-State Concentrate, 60% zinc, per ton	$84.00
ALUMINUM:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	27.10¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	33.50¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM	**Sticks and bars,** 1 to 5 ton lots (Price per pound)	$1.70
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$119.25
LITHIUM:	98%, (per pound)	$11.00-$14.00
MAGNESIUM:	**Ingots (99.8%)** F.o.b. Valasco, Texas, per pound	36.00¢
MERCURY:	**Flasks.** Small lots, New York	$255.00-$257.00
NICKEL:	**"F" Ingots (5 pounds). F.o.b. refinery, Port Colbourne, Ontario**	64.50¢
SELENIUM:	**99.5%,** per pound	$13.50-$15.50
THORIUM:	**per kilogram:**	$43.00
TIN:	**Grade A. Brands.** New York (Price per pound) Prompt delivery	98.50¢
TITANIUM:	**99.3% + Grade "A" Sponge (Price per pound)**	$3.00
URANIUM	**Nominal, per kilogram**	$40.00
U-235:	**Nominal,** per kilogram	$11,000.00
GOLD:	**United States Treasury Price**	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90.125¢
	Foreign Handy Harmon	90.75¢
PLATINUM:	**Per Ounce**	$103.00-$105.00
ZIRCONIUM:	**Sponge, Per Pound,** Nominal	$10.00

ORES AND CONCENTRATES

BERYLLIUM ORE: **10 to 12% BeO.** F.o.b. mine, Colorado — $45.00 per unit
Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.

CHROME ORE: **F.o.b. railroad cars eastern seaports. Long tons dry weight.**

African (Rhodesian). 48% Cr_2O_3 3 to 1 Ratio	$52.00-$53.00
African (Transvaal). 48% Cr_2O_3 No Ratio	$38.00-$39.00
Turkish, 48% Cr_2O_3 3 to 1 chrome-iron ratio	$55.00

U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.

COLUMBIUM-TANTALUM ORE: **At United States small lot beryl purchase depots. $3.40 per pound contained** combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)

IRON ORE:

Per Pound Pentoxide.	$1.15-$1.30
Lake Superior, Per gross ton Lower Lake Ports	
Mesabi, Non Bessemer, $1.5% Fe.	$10.85
Mesabi, Bessemer, $1.5% Fe.	$11.00
Old Range Non Bessemer.	$11.10
Old Range Bessemer.	$11.25

MANGANESE ORE:

Swedish, Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit	22.00¢
Metallurgical grade. 48 to 50% Mn. Long ton unit	$1.33
Metallurgical grade. 46 to 48% Mn. Long ton unit	$1.27
Metallurgical grade. 44 to 46 % Mn. Long ton unit	$1.24
Chemical grade. 80% MnO_2. Per Ton	$70.00

Domestic U. S. Government ore purchasing depots: Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana; base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.

MOLYBDENUM CONCENTRATE: **90% MoS_2 F.o.b. Climax, Colorado. Per pound of contained** molybdenum, plus cost of containers — $1.10

TUNGSTEN CONCENTRATE:

Domestic. 60% WO_3 Per short ton unit	$55.00
Foreign. 65% WO_3 Per short ton unit (Scheelite)	$34.00
Foreign. South American, Spanish, Portuguese	$33.00

URANIUM ORE: **Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado Salt Lake City, Marysvale, Thompsons, Moab, White Canyon Green River, and Monticello, Utah. Shiprock, and Grants, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, Tuba City, and Cutter, Arizona. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. Special lime schedule applies at Monticello, Moab and Grants. No lime penalty with no vanadium payment or lime penalty with vanadium payment.

VANADIUM ORE: **Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 **are generally acceptable at all AEC depots but excess not paid for at Marysvale, Monticello, and Bluewater.** Shiprock has no limit on V_2O_5 to U_3O_8 ratio and all contained V_2O_5 is paid for — Per Pound V_2O_5 $0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade. 70% effective CaF_2 content per short ton F.o.b.** Illinois-Kentucky mines	$32.00-$35.00
	Mexican. 70% f.o.b. border	$24.00-$24.50
	European, Atlantic Ports, 70%	$33.00-$34.00
	Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado	$47.50-$50.00
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
	Export	$30.50

LONDON METAL AND MINERAL PRICES

August 17, 1956

		Per Long Ton	USA Equivalent cents per pound[1]
COPPER:	**Electrolytic spot**	£310 0s 0d	38.75¢
LEAD:	**Refined 99%**	£117 10s 0d	14.69¢
ZINC:	**Virgin, 98%**	£96 15s 0d	12.09¢
ALUMINUM:	**Ingot, 99.5%**	£189 0s 0d	23.625¢
ANTIMONY:	**Regulus, 99.6%**	£222 10s 0d	27.81¢
TIN:	**Standard, 99.75%**	£772 0s 0d	96.50¢
TUNGSTEN:	**Long ton unit, 249 $**	$34.86	

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N. Y.

How To Repair Minor Damage To Mine Storage Batteries

Major catastrophies which cause complete destruction of mine motive power batteries are comparatively rare. Too often, however, a battery is discarded because of some minor damage, when a few simple field repairs could have put it back in service.

Repairs should be made promptly.

Field troubles may include broken covers, damaged connectors, leaky jars, and even an occasional broken separator. These repairs can be made with available shop tools or readily obtainable accessories, without serious interruption to service.

Removing connectors—Using an ordinary steel twist drill on the button weld at the end of the cell connector, drill down to a depth slightly greater than the thickness of the connector (see photograph). Then grasp the connector with a pair of pliers, using a slight rocking motion until the connector is cleared.

Removing cover—If it is only necessary to remove the cover because of breakage, the lead post seal nuts should be removed with their gaskets and the compound cut from around the inside edge of the jar wall with a warm (not hot) putty knife or a knife which has been dipped in kerosene.

Removing complete cell—Remove connectors, but do not cut compound away from jar wall. Loosen the compound between the cells, and then pull the complete cell (from negative post side) out of the tray. Use a line or rope between the cell and applied force, so that mechanical shock can be taken up without damaging cell.

Removing container—Once cell is pulled, it is a comparatively simple matter to remove the container. Make an internal inspection to determine if all the separators are in place and free of cracks, chips, or any damage which might lead to internal short circuits. An element should not be exposed to air any longer than necessary, because oxygen will combine with the negative materials, causing the element to become warm. To retard heating, sprinkle element with water or cover it with a wet cloth.

Replacing separators—In a new cell, this is relatively easy. On older batteries, it may be necessary to scrape away surplus negative materials to allow room for the new separator.

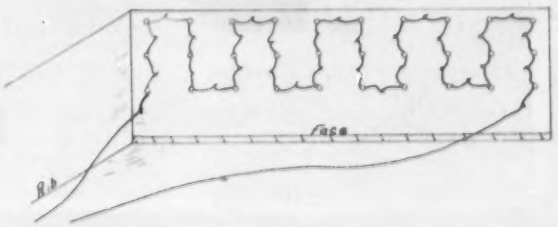
Lead burning—After completing repairs, it is necessary to reconnect the cell into the circuit by burning the connector back onto the posts in some manner.

Usually, when a cell has to be opened for repairs, some acid is lost. It is always good practice to check the fully charged specific gravity of a repaired cell and make adjustments before the cell is put back in service.

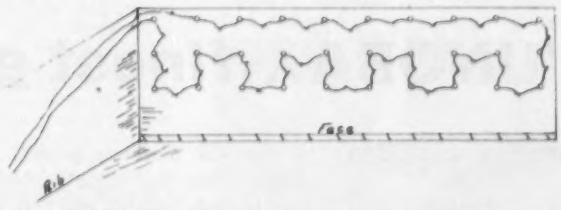
Do You Wire Your Electric Rounds This Way For Important Savings?

A new way to wire stope rounds in the potash mine of International Minerals and Chemical Company at Carlsbad, New Mexico has resulted in several advantages. While all rounds are shot from the face of wide stopes in the relatively thin flat bedded deposits, the same wiring system is applicable for any other electrically detonated round in development headings or stopes.

The two diagrams show, first, the old wiring system, and, second, the new method. Advantages of the new



OLD WIRING METHOD at International Mineral's mine.

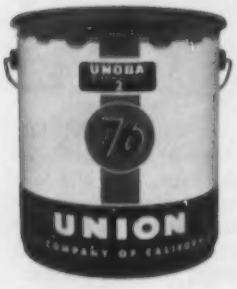


NEW METHOD used for three or more holes has advantages.

method developed by Sulo Wickstrom, 850-foot level shift foreman, include: a saving in lead wire because one wire does not have to extend across the face; one less trip across the face for the powderman when wiring the round. The lead wire saving alone at International is 252,000 feet per year. Other advantages are that the circuit (all wiring of cap leg wires) can be checked with a galvanometer before either lead wire is attached. Two spools of lead wire can be used at one time with each tied to a leg wire and unwound simultaneously as powderman leaves the face. And no lead wire is buried in the muck pile by the blast, but lies along the rib on top of the muck pile where it can easily be gathered to prevent it getting in the loading machines and mill circuit.

H. Amengual, engineer, Jamaica Rock Crushers, Inc., Cuba

"UNOBA...finest grease obtainable"



"Union Oil products protect our crusher against dust and climatic conditions which can be unbelievably bad here in Cuba.

"Sometimes our plant is deluged by tropical downpours...other times the dust gets so thick it looks like we'd had a snow storm. However, since we went into production over a year ago we've lubricated all bearings with UNOBA, and even during this rough 'shakedown' period we haven't lost a single one in the Rogers Iron Works crushers, conveyor rolls, shaker screens or anything else. In my opinion UNOBA is the finest grease obtainable for tropical operations like ours."

In spite of drenching rains and high temperatures UNOBA *stays in bearings to keep dust out*...it's truly a *multipurpose* grease. Immediately available from your nearby Union Oil representative.

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Dallas: *313 Fidelity Union Life Bldg.* • **Kansas City, Mo.:** *612 47th St.* • **New Orleans:** *644 Nat'l Bank of Commerce Bldg.* • **Boston:** *214 Harvard Ave.*

United States

Personalities in the News

EUGENE H. SANDERS (left), president of Four Corners Uranium Corporation, and J. CARLTON WARD, JR. (right), president of Vitro Corporation of America, are pictured signing a long-term contract whereby Four Corners will ship uranium ores from its mines near Green River, Utah, to the Vitro Uranium Company mill in Salt Lake City.

Dr. J. D. Forrester, dean of the college of mines at the University of Idaho and director of the Idaho Bureau of Mines and Geology, resigned to accept identical duties at the University of Arizona. Dr. Forrester has filled the Idaho post since September 1954, previously serving ten years as professor and chairman of the department of mining engineering at the University of Missouri.

J. C. Kingsbury, vice president of F. E. Schundler & Company, Inc. of Joliet, Illinois, has been elected president of the Perlite Institute, national trade association of the perlite industry. The annual meeting recently at Ponte Vedra Beach, Florida was attended by 83 members. **Kirk E. Hazelton,** assistant general manager of Perlite Division of Great Lakes Carbon Corporation, was elected vice president; **Richard O'Heir** and **Richard Funk** continue as technical and administrative manager of the Institute. **Lewis Lloyd,** president of Alatex Construction Service, New Orleans, is the retiring president.

Malcolm C. Brown, president of Sidney Mining Company, is also the new president of Mascot Mines, Inc. in Wallace, Idaho. Sidney and Mascot are closely associated in development of uranium property. **H. F. Magnuson** was chosen to be secretary-treasurer and **Ronald Eggert,** assistant secretary-treasurer.

Douglas Munroe is the new assistant to the executive vice president of the Anaconda Company, with headquarters in New York. In addition to his other duties, Mr. Munroe will have charge of the personnel department of the Anaconda Company and its subsidiary and affiliated companies.

Herbert Hoover, Jr., Under Secretary of State, is the 1956 recipient of the Hoover Medal, one of the engineering profession's most distinguished honors. The medal was named after former **President Hoover,** father of the Under Secretary and first to receive it, in 1930. It is sponsored by the American Society of Civil Engineers; the American Institute of Mining, Metallurgical, and Petroleum Engineers; the American Society of Mechanical Engineers; and the American Institute of Electrical Engineers.

A. Todd Davis, formerly public and labor relations director, is now managing the newly established industrial relations department of the Kennecott Copper Corporation's Nevada Mines Division.

P. J. O'Brien is the new vice president and general manager of United States Borax & Chemical Corporation, the company which resulted from the merger of United States Potash Company and Pacific Coast Borax Company. Four operating divisions have been created: **J. F. Corkill** is vice president and general manager of the Pacific Coast Borax Company division; **Dean R. Gidney** is vice president and general manager of the United States Potash Company division; **D. V. Parker** is vice president of the 20 Mule Team Products division; **G. A. Connell** is vice president and **D. S. Taylor,** director, of the research division. **H. M. Albright,** former president of U. S. Potash Company, has been made a special consultant to the new company.

Donald B. Gillies has retired after almost 50 years with Republic Steel Corporation and a predecessor company, the Corrigan, McKinney Steel Company. Mr. Gillies started his career in 1893 by pushing a slag pot in a Butte, Montana smelter. This was followed by rapid promotions until, in 1932, he became president of Corrigan-McKinney. When the company merged with Republic in 1936, he was named vice president, a post he held until his 75th birthday in 1947. From then until now he has been an active mining consultant for Republic.

William A. Vine, safety and industrial engineer for the Consolidated Coppermines Corporation, Kimberly, Nevada, and former associate professor at the Missouri School of Mines, has been appointed to replace **Dr. A. E. Adami,** retired, as associate professor and head of the mining department at the Montana School of Mines.

Elliott Dressner, staff geologist in Florida for the International Minerals and Chemical Corporation, Phosphate Division, has been reassigned to the office of mining and exploration at the Chicago head office.

Robert Sheldon is the new general superintendent of the Resurrection Mining Company with headquarters in Leadville, Colorado. He was formerly employed in the geological exploration department of the Newmont Mining Corporation, Grass Valley, California.

Allison B. Stout has been named a technical assistant in the engineering department of the Hayden plant, Ray Mines Division, Kennecott Copper Corporation, Hayden, Arizona. He is a 1954 graduate of the University of Miami.

R. O. Hawkanson has been chosen vice president-administrative for Oliver Iron Mining Divison of the U. S. Steel Corporation. He was previously Oliver's director of industrial relations.

Thomas W. Mitcham, mining geologist, has resigned from his position as exploration manager for International Ranwick Limited and has established consulting offices in Flagstaff, Arizona.

Arthur Notman, New York consulting mining engineer, spent some time recently in the Ambrosia Lake uranium district, north of Grants, New Mexico. While in the area, he was making an evaluation and summary of the ore reserve position of Sabre-Pinon Mining Company, in which American Metal Company has recently secured large interest.

Robert May has resigned as chief engineer for Pend Oreille Mines and Metals Company, Metaline Falls, Washington to accept appointment as a mining engineer for the Bureau of Land Management office in Spokane. **Wesley G. Hippard,** former engineer for Benguet Mining Company, Manila, Philippine Islands, also has been named a mining engineer for the Bureau in Spokane.

Allen T. Cole has established a mining consulting office in Lakeland, Florida. Dr. Cole was formerly manager of the Davison Chemical Company's Florida Phosphate operations and more recently Director of Atomic Energy Services for Grace Chemical Research and Development Company; both are divisions of W. R. Grace and Company.

D. W. Clark is geologist in charge of Phillips Petroleum's new Strategic Minerals section in the Korber Building, Albuquerque, New Mexico. The firm's New Mexico operations include drilling on properties of Holly Minerals in the Ambrosia Lake district.

Henry Bollweg has been named chief engineer of International Metals

RALPH W. NEYMAN (left) has accepted the position of president and general manager of Federal Uranium Corporation. Mr. Neyman, a veteran mining engineer and mine operater, was general manager for Hecla Mining Company until his resignation recently. He had worked for the company 26 years, directing mining operations in Idaho, Montana, California, and Utah. WILLIAM H. LOVE (right) has been appointed to the new position of manager of mines for Hecla Mining Company. Mr. Love was previously in charge of the company's Atlas mine shaft-sinking project near Mullan, Idaho, and was superintendent of the firm's Radon operations in the Big Indian Uranium district near Moab, Utah.

Corporation, Douglas, Arizona. He formerly was associated with the assay firm of Hawley and Hawley in Douglas.

Ellis Maxwell succeeds **Richard J. Hawkinson** as chief engineer for the western district of Pickands Mather & Co. on the Mesabi Range. Mr. Hawkinson has been transferred to the Hilton Iron Mines in Quebec, Canada.

Kenneth Vance, 22, was recently named assistant drilling and blasting boss in the Ray pit of the Ray Mines Division, Kennecott Copper Corporation. He received his B. S. degree in mining engineering from the University of Arizona in 1955.

Mrs. Virginia Vivian was elected president of the board of directors of the Mugwump Mining Company, Inc. at the annual meeting in Los Angeles. **Dr. Stevan T. Mayes** is vice president, and **Mr. F. W. Rollyson**, secretary-treasurer.

Charles C. Stephens, former superintendent of the Waterloo operations (Montpelier mine and mill) of the San Francisco Chemical Company, was named mines manager of the company's Crawford Mountains underground operations, replacing **John Wright**, who left to take a position in Carlsbad, New Mexico. **A. Lowell Pendrey** has been appointed to a newly created post of manager of electrical and mechanical equipment. He was previously chief electrician. **Lorraine Jacobsen** is the new assistant superintendent of the Waterloo operations, where he had been foreman.

ROBERT J. LINNEY has been given the new title of vice president in charge of operations at Reserve Mining Company. Mr. Linney has been manager of operations for Reserve since he joined the company at Babbitt, Minnesota in 1950. Later he moved his office to Silver Bay, when construction of Reserve's E. W. Davis Works neared completion. He managed mining properties for Republic Steel Corporation in New York before joining Reserve.

Alex W. Head is the new president of the board of directors, Century Minerals, Inc., of Houston, Texas. Formerly Southwestern Uranium Trading Corporation, the company name was changed at the first stockholders' meeting which also elected the officers: **William J. W. Merritt**, executive vice president; **Harold W. Bangert**, vice president; **Robert C. Whitaker**, vice president; **David W. Cunningham**, secretary; **John L. Welsh**, assistant secretary.

James M. DeLong has been promoted to chemical development engineer of the Potash Division, International Minerals & Chemical Corporation, at Carlsbad, New Mexico. He has been doing special work with the Research Division in Carlsbad for the last three years. **Joseph F. Trachta, Jr.** has the new job of instrument engineer for the Potash Division. He was formerly analytical chemist for the development department.

Don Hargrove has been transferred by Newmont Mining Corporation to Spokane, Washington from the Midnite mine on the Spokane Indian Reservation, where he was in charge of its metallurgical work on uranium ores. Mr. Hargrove, with Newmont since 1948, was in charge of the firm's Nevada operations for several years and was later stationed in Arizona and Colorado. His transfer to Spokane revived discussion on the possibility of Newmont constructing a long-considered uranium processing plant in the Spokane area.

Wendell W. Fertig, recently retired U. S. Army colonel, has joined the firm of Ball Associates, consultants in oil, gas, and minerals. He will be mining engineer consultant and minerals division chief of the Denver, Colorado branch of the company.

Obituary

C. G. "Dutch" Willard, 69, died in Denver recently following a serious illness of almost a year. He was a recognized international authority in the ore-grinding field. Mr. Willard, a graduate of the South Dakota School of Mines, was metallurgist and master superintendent for the Golden Reward Mining Company at Terry and Deadwood, South Dakota from 1914 to 1918.

He joined the Mine and Smelter Supply Company, Denver, in 1918 as assistant manager of the Marcy Mill Division. Later he became manager, and eventually executive vice president and director of Colorado Iron Works Company, Division of Mine and Smelter; and was a vice president of General Iron Works Company, the manufacturing division.

Newsmakers in International Mining

R. W. DIAMOND has accepted nomination as president of the world-wide Sixth Commonwealth Mining and Metallurgical Congress, which will convene in Canada next year. Congress plans include a cross-country inspection tour of important Canadian mining operations by 500 delegates from all parts of the Commonwealth. Mr. Diamond recently retired as executive vice president, western region, of the Consolidated Mining and Smelting Company of Canada, Ltd., having joined the staff at Trail, British Columbia in 1917.

Charles Will Wright, American mining consultant, is again active after his automobile accident a year ago. He was in Rome last January and reviewed reports on an extensive mercury property adjacent to the Mt. Amiata mine, and an American financial group has now sent its engineer to Italy to examine the property. He also went to Caltanisette, Sicily as a consultant for some 20 sulphur mine owners. The past few months he has been employed by Ford, Bacon & Davis Inc. preparing a report on the outlook for marketing Bolivia's mineral products, and has also prepared a paper "What Chance Has Foreign Capital in Chile" which will be published soon in MINING WORLD.

Philip Rabone, mining engineer in Belvedere, Southern Rhodesia, has left for England and will continue his professional work there.

D. T. Waring, president of the Federated Malayan States Chamber of Mines, was one of three Malayan representatives at the recent International Tin Commission meeting in London to establish an early date for implementing the International Tin Control Buffer Stockpile Scheme. **Chong Khoon Lin**, president of the All Malaya Chinese Mining Association, and **A. D. Dawson**, deputy comptroller of trade and industry for the Federation government, were the other two delegates from Malaya.

Gloyd Wiles, manager of the mining department of National Lead Company, left Australia in July for Indonesia and Tanganyika, East Africa. In Africa he will investigate pyrochlore deposits.

Warren T. Smith, former pit superintendent of the Lavender Pit operation of Phelps Dodge Corporation, is now mine superintendent for development of Southern Peru Copper Corporation's Toquepala mine. Seven other Bisbee, Arizona mining men have moved to Peru to work for Southern Peru, (a joint venture of Phelps Dodge, American Smelting and Refining Company, Newmont Mining Corporation, and Cerro de Pasco Corporation). **A. M. Watkins** is handling equipment problems; **Harold Amberson** is in charge of the bulldozers; **Marion Robinson** is drill boss; **Joe Farnsworth** handles the shovels; **Kenneth R. Johnson**, chief mine engineer; **Glenn H. Simons**, pit foreman; and **Leo P. Hogan**, director of personnel.

A. L. Keats, chief metallurgist, and **P. A. Vodic**, experimental metallurgist of North Broken Hill Limited, New South Wales, Australia, recently visited iron ore processing plants in the Mesabi iron range area of the United States.

N. S. Brown has been appointed a director of Euclid (Great Britain). He will continue to act as secretary of the company.

J. C. Burns has been elected chairman of East Rank Consolidated, Ltd., London, England. He replaces **Major-General W. W. Richards** who will remain as a director.

Edgardo Portaro, manager of Banco Minero del Peru, has been elected senator for the department of Pasco, Peru where many large mines are located, including Cerro de Pasco, Colquijirca, Huarón, and Atacocha. He started a six year term in July.

K. L. McRorie has moved up to the position of general superintendent of underground mining at Steep Rock Iron Mines, Ltd., Ontario, Canada. He has been replaced as superintendent of the Hogarth mine by **R. S. Andrecheck**. Mr. Andrecheck turned over his former job as open pit superintendent to **J. K Kervin**.

Dr. Robert F Mehl, director of metals research laboratory and head of metallurgical engineering at Carnegie Institute of Technology, has been named to receive the "Grand" Medal of Le Chatalier by the Council of the French Society of Metallurgy. The award will be presented to Dr. Mehl at the society's annual symposium on Metallurgy October 22-27 in Paris, and it honors him for his distinquished service in the field of metallurgical engineering research. Other recognitions of Dr. Mehl's achievements include the Gold Medal Award of the American Society for Metals, the John Scott Metal, Howe Medal of A.S.M., James Douglas Medal, and the Sauveur Achievement Award.

ISAMU BADA, left, and TOSHIKAZU NAKA, right, are two officials of the Sumitomo Metal Mining Company of Japan who recently completed a round-the-world survey trip, visiting prominent mines, milling plants, and smelters. While in the United States they visited the

White Pine Copper Company in Michigan; Phelps Dodge Corporation's copper refineries in New Jersey; Anaconda Company's Butte, Great Falls, and Anaconda, Montana mines, smelters, and refineries; and the Tacoma, Washington copper smelter of the American Smelting and Refining Company. In Canada they visited International Nickel and Sherritt Gordon Mines. Mr. Bada is a director of Sumitomo with offices in Tokyo and Mr. Naka is a metallurgist at the company's Niihama copper smelters and refineries.

MERLE H. GUISE, mining engineer from New York, has returned from a trip with his wife that took them into forty countries around the world. This covered Malaya and other areas where he had mined tin and other metals. In Melbourne, Australia and Kuala Lumpur, Malaya he was invited to comment on the radio about the adventures of mining and to give comparisons of past and current problems in mining. His headquarters are now at Chateau Frontenac, Quebec, while he investigates mine possibilities in eastern Canada.

William S. Row is the newly appointed vice president and managing director of Anglo-Huronian Ltd., a large Canadian holding company with a substantial interest in Kerr-Addison Gold Mines. Mr. Row is also executive vice president of Kerr.

J. C. Webb, chief field engineer of the Australian Atomic Energy Commission, with **P. J. Eaton** and **O. Soskice** of the Combined Development Agency, joint organization of the United States, United Kingdom, and Canada, visited recently the Grand Junction, Colorado office of the U.S. Atomic Energy Commission.

C. W. Kannatt, professor of Metallurgy at England's Royal School of Mines, has been elected president of the Institution of Mining and Metallurgy. He delivered his presidential address "The Study of Technology as a Branch of Education" at the recent annual general meeting of the Institution. At this meeting the traditional gold medal was given to **Dr. Joseph Bancroft** for his outstanding work in the Rhodesian Copperbelt since 1927.

Dr. Wojech Domzalski has joined Hunting Geophysics Company, England, as the chief geophysicist. During the last eight years Dr. Domzalski has been employed in gravity, seismic, and electrical methods of geophysical prospecting in many parts of the world.

K. H. Grant is the new manager of Golden Plateau N. L. at Melbourne, Australia. He replaces the late J. L. Moore.

GREAT NEW THOR 3-BOOM JUMBO

More rounds per shift! Completely air-operated!

Drills rounds faster

Easy to set up and operate

This powerful new "big brother" of the famous Thor two-boom jumbo offers the same time-saving, money-saving advantages—increased by 50%! With three booms you can drill half again as many rounds before shifting to a new location.

Again Thor offers the tremendous advantage of being completely air-operated, with no hydraulics involved. Thor Jumbos are easiest to set up and easiest to operate. Horizontal swing of booms is automatically locked by air pressure, and controlled by operator without leaving position.

Rounds are drilled faster with a Thor Jumbo because boom position is quickly changed by releasing air pressure. Steels are changed easily and fast. The three booms can support rotary-motor power feed drifters, chain feed masts or air-cylinder feeds.

Hollow booms carry all supply and control pipes. Maintenance is easy and inexpensive because air motors are removed without disturbing booms. Ask your Thor distributor for a demonstration. Thor Power Tool Company.

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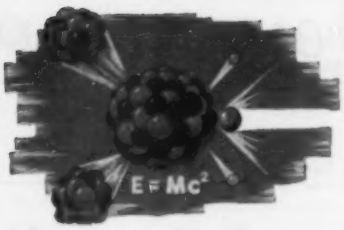


FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

Mexican Hat U_3O_8 Mill To Treat Happy Jack Ore

Texas-Zinc Minerals Corporation, a joint Texas Company and New Jersey Zinc Company venture, made important uranium news in July. First, it purchased the Happy Jack mine at White Canyon, San Juan County, Utah, from the Bronson and Cooper Mining Company, and second it signed a U_3O_8 purchase contract with the Atomic Energy Commission.

Building of a mill to treat Happy Jack and some custom ores has already started at Mexican Hat, Utah, with the sampling plant for ore purchasing scheduled for completion this year and the entire mill scheduled for operation in September 1957. Testing is under way by Colorado School of Mines Research Foundation to see if the solvent extraction process can be used. Stearns Roger Manufacturing Company of Denver, Colorado has the construction contract.

E. R. Filley, vice president of Texas Company's production department is Texas-Zinc president; F. L. Maloit, New Jersey manager of western mines is Texas-Zinc vice president; A. L. Hayes, assistant to vice president of New Jersey, is mill project supervisor; Kenneth Apland, New Jersey's Austinville, Virginia mill superintendent, will be Mexican Hat mill superintendent.

Housing will be provided at the Happy Jack mine. A road will be built from White Canyon to Mexican Hat. Also under way is the study of open pitting near-outcrop ore at the mine.

Texas-Zinc is continuing its program of uranium prospecting in four states.

Northspan's Record U_3O_8 Contract for Blind River

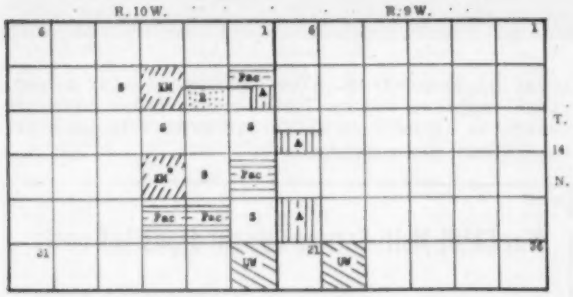
Northspan Uranium Mines, Ltd., formed by the amalgamation of three important Blind River, Canada, uranium companies—Spanish American Mines Limited, Panel Consolidated Uranium Mines Limited, and Lake Nordic Uranium Mines Limited, has received a letter of intent from the Canadian government for purchase of $242,416,800 worth of uranium concentrate for delivery in 1962.

Northspan is building three mills with a combined daily capacity of 9,000 tons to produce the concentrate. Rio Tinto Company of Canada, Ltd., and the Joseph H. Hirshorn interests recently merged to form Northspan.

Turkey Plans Control Law For U_3O_8 Prospecting

Under existing Turkish law, there is no definite control over uranium prospecting. In order that prospecting may be speeded up on a scientific basis, the MTA Institute (with headquarters in Ankara) which is the government's institute for exploration and geology has proposed that a uranium prospecting law be enacted. Therefore, a proposal has been made to the Ministry of Exploration for such a law with all prospecting to be under the supervision of MTA Institute. The Ministry officials are drafting such a law for submission to Parliament.

Three Ambrosia Lake Companies Form Kermac Nuclear Fuels



OWNERSHIP LEGEND:

KM Kerr-McGee Oil Industries, Inc.
Pac Pacific Uranium Mines Company
A Anderson Development Corporation
KM* Kermal 85%—United Western Minerals Company and Associates 15%
S Sabre-Pinon-American Metals
R Rio De Oro Uranium Mines, Inc.
UW United Western and Associates

Ambrosia Lake, New Mexico, now has another financially strong uranium mining and milling company with important ore reserves. It is a new company—Kermac Nuclear Fuels Corporation—formed by Kerr-McGee Oil Industries, Inc.; Pacific Uranium Mines Company; and Anderson Development Corporation. Kerr-McGee holds the controlling interest and will staff and manage the new corporation. Each of the three partners controls important ore reserves discovered and partially delimited by drilling on the sections shown on the accompanying map.

Corporation engineers have estimated combined reserves are in excess of 5,000,000 tons of ore in the Westwater Canyon sandstone member of the Morrison formation. The ore bodies do not crop out, but are buried from 350 to 800 feet deep. Drilling is continuing on a number of leases and claims to extend the ore reserves. In July Kerr-McGee was operating seven drills which completed an average of seven holes per day on Section 10 extending the known ore both west and south from the original discovery hole which adjoins Sabre's major ore body on Section 23. The accompanying photograph taken from the air shows hole pattern over an ore body.

In June drilling on Section 22 had indicated over 2,900,000 tons of ore averaging 0.33 percent U_3O_8 with good indications for substantially increasing that tonnage.

Mining plans are still being drawn, but first production may come from Section 10 adjoining Rio de Oro Uranium Mines Inc. where the ore horizon is only 350 feet deep. It will require a separate mine to produce from Sections 22, 26, and 27. An unusual mining plan and operating agreement will be necessary for Kermac Nuclear and Sabre-Pinon-American Metals where one orebody is covered by the two ownerships and such ownerships converge to form a common vertical line boundary. This is at common point of Sections 23, 24, 25, and 26.

Engineering studies and metallurgical test work have been started in anticipation of building a major uranium mill to treat Corporation and custom ore at a site a few miles west of Grants. A U_3O_8 purchase contract is also being negotiated with the United States Atomic Energy Commission.

Dean A. McGee, president of Kerr-McGee will head the new corporation.

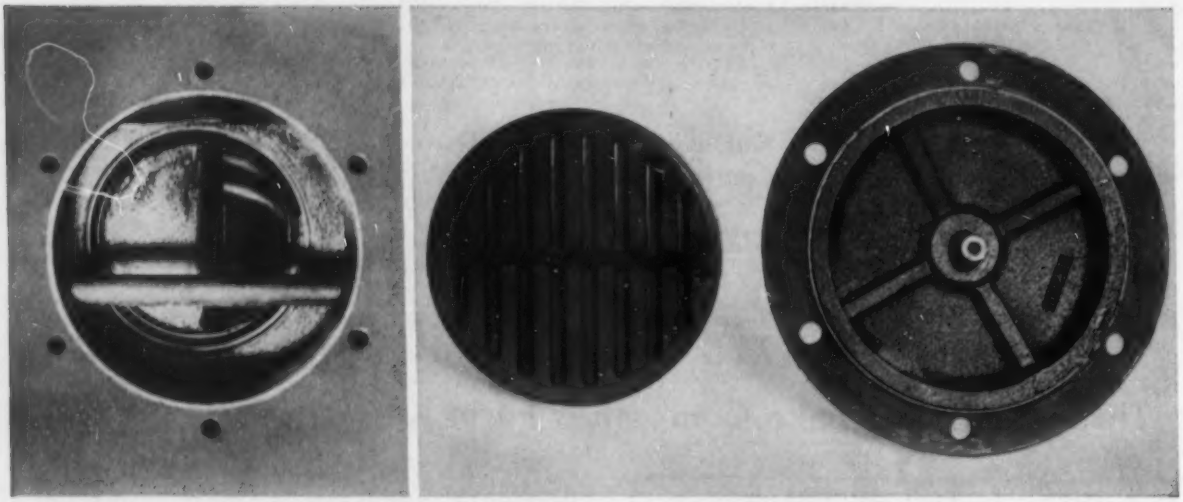
The Engineer's Field Report

CASE HISTORY

LUBRICANT *Calol Multi-Service Oils*

LOCATION *Arizona*

Compressor valve parts free of deposits after working 40,680 hours in constant dust



NOTE CLEANLINESS of this valve port, channel valve and cover (left to right) when removed for first time from a two-stage air compressor...after 40,680 hours of work! Lubricated with Calol Multi-Service Oil since installation 11 years ago, the unit supplied air—5000 cubic feet per minute—for a giant Arizona copper mine. Compressor was housed in open shed where dust and grit were always present in the air...yet there was practically no wear or formation of deposits. Since moved to another mine site, the compressor still has all its original parts.

Calol Multi-Service Oils keep wear rates low and carbon deposits to a minimum in any type of reciprocating compressor. Also recommended for pumps, diesel engines and enclosed gears. These oils are available in several different grades to meet all conditions and requirements.

CALOL

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Why CALOL Multi-Service Oils cut deposits & costs

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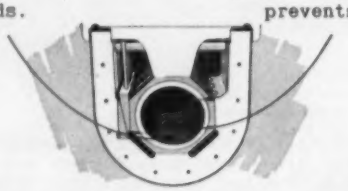

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Mid-Year Review of South African Mineral Output Shows Potential Increase Over 1955

A mid-year review of mining production in the Union of South Africa has indicated that increases in output this year will be recorded for gold, coal, platinum, copper, iron ore, titanium oxide, fluorspar, iron pyrite, magnesite, and quarry products (especially lime for the uranium plants).

Together with uranium oxide, gold returns will be the feature this year of mining statistics. Gold output, which in 1954 and 1955 amounted to 13,237,119 and 14,601,404 fine ounces, should comfortably exceed 15,400,000 and may even reach 16,000,000 ounces by the year-end. The major factors in this tendency are the improved Native labor force, greater electric power supplies, new production, and the expansion of output from mines which recently entered the production stage. It was recently stated that the extension of mechanization in mining operations was approaching its practical limits, and that the introduction of incentive schemes would have to receive greater attention as a means of raising output duties and efficiency. Also, in this regard, the Government is considering ways and means of assisting marginal gold producers and will positively assist ultra-deep operations.

Areas or zones continuing to attract attention are the Kinross zone; the block of mines on the Far East Rand comprising Daggafontein, Vogelstruisbult, Marievale, East Daggafontein, and possibly Grootvlei and East Geduld, which may perhaps be grouped in a combined uranium project, utilizing the extraction plants of Daggafontein and Vogelstruisbult; the ultra-deep levels of the Central and West Rand, especially that south of the West Driefontein and Blyvooruitzicht mines; the Durban Deep/South Roodepoort zone; the exploration prospect of Johannesburg Consolidated Investment and Free State Development east of the Libanon-Venterspost mines; the Klerksdorp area, including work on the Dominion Reefs; and the Orange Free State.

Sales this year of prescribed minerals (mainly uranium and thorium) should easily top £35,000,000. Vaal Reefs and Merriespruit have already begun uranium production; West Driefontein, Doornfontein, and Hartebeestfontein should be producing by the year-end. By that time, Klerksdorp Consolidated Goldfields may have been declared a uranium producer. In general, the price paid for uranium oxide output is related to the gold revenue of individual mines; this doubtless accounts for the marked variations in the unit declared profits from uranium sales from mine to mine. In the Orange Free State, Loraine, Freddies Consolidated, Free State Geduld, Western Holdings, Welkom, and Presidents Brand and Steyn, are grouped in a combined uranium project with treatment of gold residues being effected or to be effected in the Welkom and President Steyn uranium plants, the extensions of which should be completed by about mid-1957. Full-scale treatment of residues from Loraine, Free State Geduld, Western Holdings, and Welkom should be underway after that date. Small-scale treatment of Loraine residues should be effected within the next few months.

The capacity of the rail transport system will again improve this year. This increase is likely to be almost completely absorbed in handling the internal traffic. However, there have been indications in more recent months that a greater truckage capacity may become available for moving, particularly greater tonnages of manganese and chrome ore. Whether there will be greater output of these ores seems dependent on the reduction of accumulated stocks; perhaps a slight increase in output can be expected, over last year's figures of 649,475 and 597,372 tons respectively.

Production of antimony concentrates is expected to be lower than last year's figure of 24,834 tons. There should be a slight expansion of output of tin metal and concentrates; and asbestos production should move up a little from last year's figures of 119,698 tons. At this writing, little more can be said of tungsten than that last year's levels may be reached.

Output of diamonds from South African sources will fall below the 1955 figure of 2,628,917 carats; but that from Consolidated Diamonds in South West Africa and from Williamson Diamonds in Tanganyika should reflect perhaps substantial increases.

New U. S. Firm Buys Chavin Assets in Peru

All of the properties and assets of Chavin Mines Corporation S.A. in Lima, Peru have been sold to Minerals Incorporated (U.S.A.) for $2,400,000. Included in the sale are: nine mining concessions located in the province of Castrovirreyna, Department of Huancavelica, comprising about 3,600 acres, on a small part of which the Chavin mine is located; one mining concession in the Province of Yauyos, Department of Lima, covering about 430 acres; all of the machinery, equipment, supplies, and fixtures owned by Chavin; and an option held by Chavin to acquire the Telepaccha properties located in the District of San Jose de Acombambilla, Department of Huancavelica, comprising 11 mining concessions totaling about 1,100 acres.

The Chavin mine is a high-grade lead-zinc-copper-silver deposit. Chavin began exploration and development of the property in 1952, after it had been formed by Consolidated Guayana Mines Ltd., and Frobiserh, Ltd., affiliated with Ventures, Ltd. of Canada.

Minerals Inc. was formed in Delaware in June 1956. Two affiliates of Ventures are stockholders and three directors of Ventures are directors in the new firm. R. C. Bacon, formerly with Ventures, has been named president and a director. G. E. Kruger, vice president and a director, is also a former Ventures associate.

The purchase contract provided that $10,000 be paid upon execution; and $190,000 on or before October 1, 1956. The balance of $2,200,000 is payable in annual installments starting on September 30, 1958 in an amount equal to the product of the number of tons of ore extracted and treated in the company mill during the preceding 12 months (which shall not be less than 45,000 tons) multiplied by an amount per ton varying from $2.00 to $6.70 depending upon the aggregate average prices of lead and zinc for such 12-month period. The contract then goes on to stipulate other payments and conditions.

The Chavin Mine has been under development for four years. There are more than four miles of underground workings, and ore has been developed by adits on four levels, exposing eight veins. Ore reserves are estimated at 271,410 metric tons of proven ore, and 81,620 metric tons of probable ore, assaying 8.0 percent lead, 12.5 percent zinc, 0.8 percent copper, 4.1 ounce silver, and 0.008 troy ounce gold per metric ton.

Atlas Builds Two Plants Near Toledo Copper Mine

A combined smelter and refining plant will be built by Atlas Consolidated Mining and Development Corporation at Sangi, near its Toledo copper mine in Cebu, Philippines. An acid and fertilizer plant will also be constructed to use as raw material the pyrite by-product of the copper mine operation, containing 43 to 47 percent sulphur.

By the end of 1956 the smelter-refinery will handle the entire production of Atlas concentrates: 10,000 tons of ore daily or 10,000 tons of concentrates per month. The capacity can be doubled in the future to process increased Atlas production and ore from other Philippine copper mines.

Atlas will establish a new power plant with a capacity of 40,000-kw to provide power for the smelter-refinery and the acid-fertilizer plant.

When the copper mine expands its milling capacity to 10,000 tons per day late this year, the daily production of high-grade pyrites will be about 600 metric tons. About 200 tons of pyrites will be used in the acid and fertilizer plant, and the remainder will be sold.

The fertilizer plant will be capable of producing any type of fertilizer required in the Philippines and the Far East. It will cost about $3,500,000, including machinery and equipment supplied by Saint Gobain, Chauny et Cirey, Ltd. of France for $1,600,000.

The first shipment of iron ore from the Atlas mines at Mati, Davao, Philippines, was made early in July to Mitsubishi Metal Mining Company of Japan. This shipment of 6,500 tons has been followed by several others totaling about 40,000 tons. Positive ore reserves at Mati are estimated at 1,570,000 tons and further exploration is expected to reveal additional deposits.

Advice Offered Bolivia On Nationalized Mines

Suggestions for the reorganization of the Corporacion Minera de Bolivia which manages the nationalized mines were presented to the Bolivian government recently. This was the result of a study made by the New York firm of Ford, Bacon and Davis, consultants who were engaged by the United States government to prepare recommendations to improve the efficiency of the Corporation. The International Labor Organization also participated in the investigation.

The foremost proposals resulting from the study are: to install a board of directors which will have no executive function; to appoint a president to represent the Corporation; to appoint a general manager with full executive power, and nine sub-managers with their own departments.

NORWAY—*Titania* A/S and *Norsk Hydro* are said to be discussing a plan for producing titanium in Norway. Titania A/S is the sole miner of ilmenite ore in the country and Norsk Hydro is Norway's largest industrial firm. The proposal provides that Titania would deliver to Hydro a purified ilmenite concentrate free of iron and containing from 45 to 50 percent titanium dioxide. At its plant in Heroya, East Norway, Hydro would treat this concentrate with chlorine and magnesium to obtain pure titanium. It is estimated that this process would yield about one ton of titanium for every two tons of the purified concentrate treated.

SPAIN—The National Institute of Industry which owns Spain's principal existing aluminum plant, the *Empresa Nacional de Aluminio* at Valladolid, is to build a second and larger plant at San Balandran near Aviles at a cost of about £3,000,000. Production will be 15,000 tons annually, including aluminum alloys, ingots, and plate.

YUGOSLAVIA—At the *Bor* copper mines in Serbia, the new section of the copper ore flotation plant went into operation in June. Capacity has thus been increased from the previous 4,000 tons per day to 6,500 to 7,000 tons daily. Bor is now floating 5,000 tons per day. The new flotation plant uses Fagergren cells. A promising ore body is being opened up 25 kilometers north of Bor on the Crni vrh Mountain about halfway toward the *Majdanpek* mines.

WEST GERMANY—Iron ore deposits estimated at 1,500,000,000 metric tons, with an iron content of 30 percent, are currently being explored north of the *Salzgitter Works*, and, according to the chairman of the company—Herr Ende, mining operations will start next spring. The quality of the ore is described as superior to that found south of Salzgitter so that processing may prove less costly. It is estimated that shaft sinking will cost about Deutsche Marks 70,000,000 for each mine of 1,500,000 tons annual output. According to surveys carried out so far, there seems to be reason to believe that an ultimate output of 22,000,000 tons per year, working about 15 mines might be feasible and an economic proposition.

NORWAY—*A/S Norsk Aluminium Company (NACO)* is to increase output at its works at Hoyanger, West Norway, by some 50 percent to about 13,000 tons a year. The capacity of the company's subsidiary, *A/S Nordisk Aluminiumindustri*, in Holestrand, which operates the only rolling mill for aluminum in Norway, has also been increased in recent years. The new plant is scheduled to start production in 1958 and to come into full production in 1960. It is estimated that the project will cost around 30,000,000 Krone.

YUGOSLAVIA—The electrolytic zinc plant at Sabac in northwest Serbia started operations in May and the cadmium section in July. It is anticipated that electrolytic zinc production for 1956 will total 6,000 tons, and rise to 20,000 tons by the end of 1957.

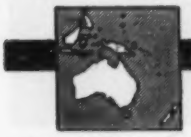
WEST GERMANY—*Vereinigte Aluminium-Werke A.G.* reports that its annual output last year totaled 94,665 metric tons of crude aluminum, compared with 88,240 in 1954 and 72,980 in 1953. In 1957 the complete reconstruction of the smelter at Grevenbroich will be finished and this will lead to a rise of 12,000 tons in the yearly output, bringing West Germany's total annual capacity to 160,000 tons.

NORWAY—Coal production in the Norwegian mines in Spitsbergen—only 600 miles from the North Pole—is to be doubled in the next five years. Output in 1955 was about 300,000 tons, all from the mines at Longyear City settlement. It is proposed to raise output at Longyear City to about 400,000 tons, and to resume production at the King's Bay mines at the rate of about 200,000 tons a year. Part of the increased output may be converted into coke for the steel plant at Mo i Rana, North Norway. Despite difficulties due to severe cold, coal production last winter has been good, with an output of over 2,000 tons on some days. A White Paper published by the Norwegian Ministry of Industry said that it hoped to ship 375,000 tons of coal this summer (300,000 tons last year). Demand for Spitsbergen coal is strong from a number of countries. The White Paper estimates production at the Russian mines in Spitsbergen at 250,000 tons last year, and 275,000 tons this year. Norwegians in Spitsbergen number 1,050. The number of Russians is understood to be about 2,500.

BULGARIA—An extensive iron ore deposit has been discovered near Sofia in western Bulgaria. The deposit is said to contain hematite, limonite, and sid-

erite ore, in addition to lead and barite. The ore lies near enough to the surface to permit open-pit mining operations to be undertaken.

ITALY—The Italian marble industry showed a 10 percent increase in output in 1955, and a 15 percent increase in exports. Sales of marble and related materials abroad totaled 270,000 tons, compared with 236,000 tons in 1954.



NORTHERN TERRITORY—*National Lead Company* of New York has made a provisional agreement to provide £84,000 to *New Merloo Gold Mines N.L.* at Tennant Creek. New Merloo will continue under present direction. National Lead will receive for one shilling per share, shares in New Merloo paid to 1/6 (1½ shillings). New Merloo is one of the many small gold mines in the Tennant Creek area.

REPUBLIC OF THE PHILIPPINES—*Itogon Mining Company, Suyoc Consolidated Mining Company,* and *Palidan-Suyoc Deep Level Tunnel Company* have been merged into a single company under the name of *Itogon-Suyoc Mines, Inc.* headed by Mrs. Mary Marsman. The new firm plans to enlarge the capacity of the Itogon mill and to build a new Suyoc mill, concentrating on the production of copper and other base metals.

NEW SOUTH WALES—In common with a number of other uranium exploration companies, *Uranium Holdings N.L.* has turned to rutile. Leases covering 385 acres have been taken under option in the Brunswick Head district on the northern coast. The leases are being test bored by *Mineral Deposits Pty. Ltd.* who has been given, at its request, an option over 500,000 Uranium Holdings shares at par. Mineral Deposits Pty. is controlled by *National Lead Company* of the United States.

NEW CALEDONIA—*Le Nickel's* expansion program at Donambio is progressing. The building for the new refinery is under construction and the four new electrolytic furnaces are being assembled. When in full operation the plant capacity will be 10,000 tons of nickel annually. For the next few months work on the extension of the hydroelectric dam on the Yate River will be going on.

TASMANIA—A discovery of chromite is reported from Circular Head, between Christmas Hills and Arthur River, on the northwest coast. Prospecting is in progress on a deposit said to be extensive. Australia lacks satisfactory reserves of chrome ore and imports extensively from Southern Rhodesia.

REPUBLIC OF THE PHILIPPINES—The first shipment of iron ore from *Atlas Consolidated Mining and Development Corporation's* iron mine at Mati, Davao, was made during the first week of July. The shipment of 6,500 tons of ore assaying 64.59 percent iron went to Japan. A 9,700-ton shipment followed this later in the month, and four more totalling 30,000 tons were scheduled for August. Positive ore reserves are set at 1,570,000 tons; however, further exploration will be undertaken this year to develop additional tonnages.

Intense heat no problem for Super Belts

This hydraulic press at Hackney Iron and Steel Co., Enid, Oklahoma, shapes red hot steel plate into tank heads.

The flat leather belt formerly used on this type of press, would stretch, slip, and come off. Tightening the belts only overloaded the bearings. For this press, a Gates Super Vulco Rope drive was chosen because it withstands the near-by intense heat, and its extra horsepower capacity permits lighter weight sheaves; thereby reducing load on bearings.

Claude King, maintenance superintendent, reports: "This Gates V-belt drive has operated 8 hours a day for 5 years without lost time due to maintenance."

Super Belts on vibrator last 7 times longer

James Gann, general superintendent of John B. LaGarde, Inc., Anniston, Alabama, reports:

"Practically every condition exists to shorten V-belt life on the vibrator drive of this concrete block machine. The machine starts and stops 4 times a minute. Intense vibration must be absorbed by the V-belts to protect motor and bearings. Sand and concrete, oil and grease all get into the drive.

"With Gates Super Vulco Ropes, we get about 7 times the average life we received from any other make, It is hard to believe that belts can take this punishment, but Gates Super Vulco Ropes do it."

Solve tough drive problems with this super tough V-belt

If present V-belts are wearing out too fast . . . if heavy shock loads . . . oil and heat . . . or other conditions are causing too frequent replacement . . . here's the answer:

Gates Super Vulco Rope—the oil and heat resistant V-belt with 40% more horsepower capacity. Easily handles heavy shock loads.

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Gates SUPER VULCO ROPE Drives

WESTERN AUSTRALIA—The taking over of *Nevoria* gold mine at Marvel Loch by *Great Western Consolidated Ltd.* has created interest. At Marvel Loch there are two lines of lode about a mile apart on which are a number of leases. None have been worked below 400 feet and their combined output amounted to several hundred thousand tons of 7 dwt. ore. Prospects of success therefore appear attractive. The Nevoria No. 2 shaft is being stripped to its present 250-foot depth and will be made 15 feet by 5, that is, standard with the company's Fraser shaft at Southern Cross.

REPUBLIC OF THE PHILIPPINES—*Liberty Chromite Mining Corporation* is stockpiling chrome ore at its mine near Puerto Princesa, Palawan. Shipments will be made when the company completes construction of a loading dock at the port town.

NORTHERN TERRITORY—*Peko Mines N.L.* has shipped by chartered freighter what is claimed to be the largest shipment of copper concentrates ever to leave Australia. 7,000 tons were valued at over £700,000, and sent to Japan. Payment was in sterling. Peko is sinking an additional shaft and plans to increase concentrate production over the next two or three years to about 36,000 tons (about 9,000 tons copper). A treatment plant will probably be built at Tennant Creek when the increased production has started, although no final decision has been made.

QUEENSLAND—*Rio Tinto Ltd.* reports that *Mary Kathleen Uranium Ltd.* has contracted to sell uranium oxide valued at more than £37,500,000. About £375,000 has already been spent on the diamond drilling program and contracts have been let for part of the £9,000,000 treatment plant which is scheduled to begin production before March 1959. Rio Tinto has a 56 percent interest in Mary Kathleen; *Australasian Oil Exploration Ltd.* holds 35 percent, and the original vendors 9 percent. Australasian Oil Exploration has also recently exercised its option to purchase mineral lease application rights from C. J. Foyster. They are north of Brisbane and a plant is expected to begin large-scale production in about a year.

REPUBLIC OF THE PHILIPPINES—*Baguio Gold Mining Company* milled 13,069 tons of ore in June for a recovery of 2,885.55 ounces of gold. This represents an increase over May when 2,746.34 ounces were recovered. During June *Palawan Quicksilver Mines, Inc.* treated 1,975 tons of cinnabar ore for a recovery of 15,783 pounds, or 207 flasks of 76 pounds each.

NEW ZEALAND—Applications have been filed for permission to explore for ilmenite and other minerals in the sands of Nine Mile Beach and Carter's Beach. Among those filing are W. B. R. Martin, B. R. Law, J. M. C. Fletcher, and Sir James Fletcher.

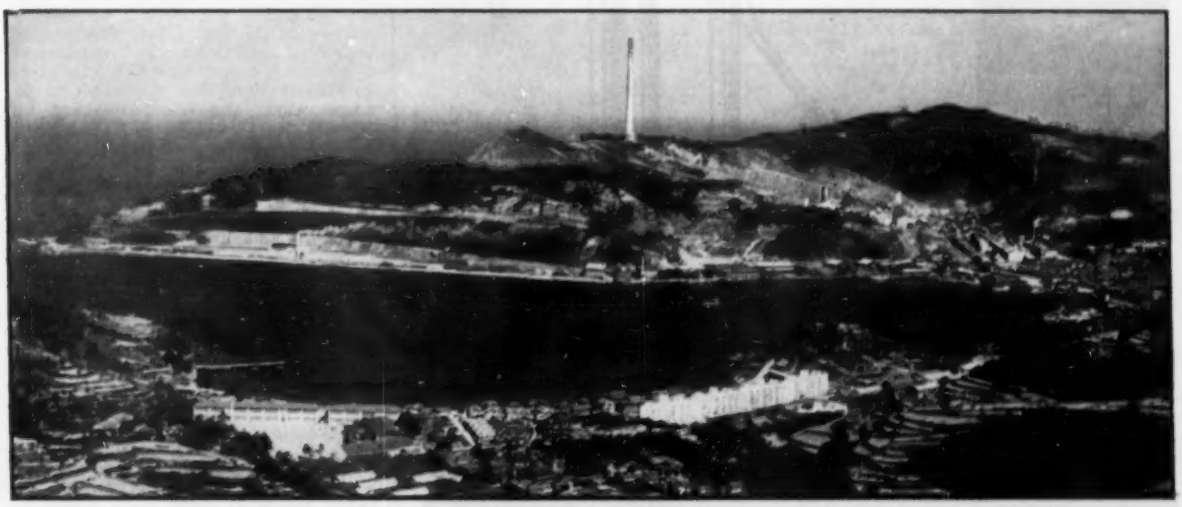
THAILAND—*Mitsui Mining & Smelting Company* of Tokyo, Japan has signed a contract with a leading Chinese trading Company in Thailand for the establishment of a joint mining company which will develop a group of tungsten and tin mines in Thailand. The new firm will go into business in September if each government gives its approval. According to a survey made by the Mitsui staff, mineral reserves are estimated at 540,000 tons of tungsten ore containing 1.1 percent WO_3 (recoverable ore 450,000 tons) and 80,000 tons containing 1.9 percent WO_3 (recoverable ore 45,000 tons). Annual profit is expected to amount to 163,000,000 yen against a total investment of 455,000,000 yen.

JAPAN—The *Nippon Mining Company* has decided to apply the oxygen-enriched air smelting method to copper smelting at its Hitachi plant, the company's largest smelter. The method has been studied for some time at the Saganoseki smelter and after successful test operations it was decided to apply it on an industrial scale. The investment will be about 850,000,000 yen, and it will take a year to complete the installation. The Hitachi plant currently produces 1,600 metric tons of electrolytic copper in an average month. With the new method, annual capacity is expected to reach 24,000 metric tons, and output of sulphuric acid will increase from 6,000 metric tons monthly to 10,000 metric tons.

MALAYA—Results of prospecting operations on *Killinghall Tin Ltd.'s* rubber estate to the north and east of the land now comprising the present mining subleases have disclosed payable values of tin on approximately 322 acres. Agreement has been made with *Killinghall (Rubber) Development Syndicate Ltd.* to sublease this area on terms similar to those existing in current subleases. An additional 80 acres of the estate will be tested for tin values and this land will also be subleased if the drill results are satisfactory.

BURMA—*Anglo-Burma Tin Company* and the Burmese government have agreed on terms for a joint venture. A Burmese registered company will be formed with 49 percent of the shares allotted to Anglo-Burma Tin for all of its assets in Burma, and 51 percent of the shares allotted to the government for cash. This cash will be used to provide necessary capital for rehabilitation and mechanization of the mine.

THAILAND—The Ministry of Foreign Affairs has lifted the ban on tin by re-



Japan Mining Company Expands Nickel Smelting at Saganoseki

The Japan Mining Company has completed a new addition to its ferronickel smelter at Saganoseki, Oita Ken, Kyushu, Japan. The picture above shows the entire Saganoseki smelter area. The nickel furnace is at the top left where the white plume of smoke comes from the stack. The copper smelter is below and to the right of the high stack in the center while the electrolytic copper refinery is in the long buildings near right side of picture. Workmen's apartments and houses are in the foreground. The new plant will increase capacity from 60 to 90 tons per month. Increased output is already sold under contract in England with 1,200 tons of ferro nickel to be delivered during a two-year period. Nickel ore for furnacing is imported from New Caledonia.

moving it from the list of strategic goods. Rubber is still on the list.

JAPAN—In order to meet current steady demand for ferronickel, both from abroad and domestically *Nippon Mining Company* has decided to add a third 90-ton blast furnace to its plant at Saganoseki. Last year the firm expanded by replacing a 60-ton furnace with a 90-ton unit, and then adding another 90-ton furnace later. With the newest addition to be completed by next March, the total capacity of ferronickel production will be increased by 270 metric tons per month. The nickel ore will be imported from New Caledonia and Celebes.

TURKEY—The manganese mines of Silivri on the northern shores of the Marmara Sea about 20 kilometers northeast of town, will produce about 6,000 tons of ore this year.

PAKISTAN—The *Pakistan Industrial Development Corporation* is supplying gypsum to the Sindri fertilizer plant in India under a contract which should take about five months to complete.

BURMA—Mineral exports from the Mergui district during the first six months of 1956 are compared with the same period of 1955 as follows: wolframite concentrates 30 tons in 1956, 52 tons in 1955; tin concentrates 203 tons in 1956; 220 tons in 1955; mixed concentrates 59 tons in 1956, 139 tons in 1955; total, 292 tons in 1956 and 384 tons in 1955. Mineral export figures from Tavoy district for same periods are as follows: wolfram concentrates 723 tons in 1956, 632 tons in 1955; tin concentrates 283 tons in 1956, 219 tons in 1955; mixed concentrates, none in 1956, 20 in 1956; total, 1,006 tons in 1956, and 901 tons in 1955.

MALAYA—A new company will be organized to develop *Eastern Minerals Trading Company's* leases of ore-bearing land in the north Malayan state. Japanese financiers will have a 45 percent interest in the firm. They will provide engineers, technicians, and machinery. The leases are now being tested for manganese and iron, but permission to go ahead with the venture must first be obtained from the federal government in Kuala Lumpur.

JORDAN—Representatives of the Arab League have signed a charter which provides for the formation of a potash company which Jordan and the Arab League members will launch in the Jericho area to develop Dead Sea minerals. The project is estimated to cost £4,500,000.

CYPRUS—*Cyprus Copper & Sulphur Company*, a subsidiary of *Esperanza Copper & Sulphur Company, Ltd.*, is continuing stripping of overburden at Limni in order to uncover at least one year's supply of ore as soon as possible. Exploratory drilling at and around Kinousa and Evloimeni is under consideration because the stage has been reached where additional ore reserves are of vital importance. During the fiscal year which ended March 31, 1956, total shipments amounted to 46,530 tons of Kinousa pyrite and 7,770 tons of Limni concentrate.

MALAYA—*Ampat Tin Dredging Ltd.'s* three dredges worked satisfactorily during the past financial year and work continued on the installation of the gravel pumping equipment on the Tujoh Section. Two 8-inch plants have now started opening-up operations and a third will be installed in due course. The Batu

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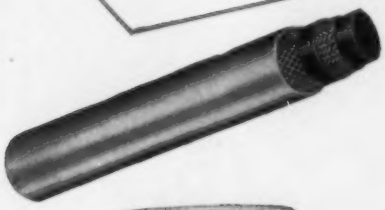

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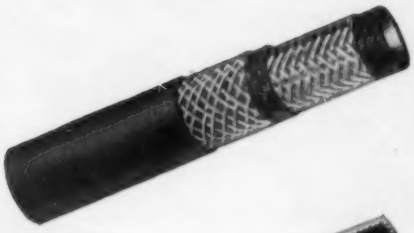

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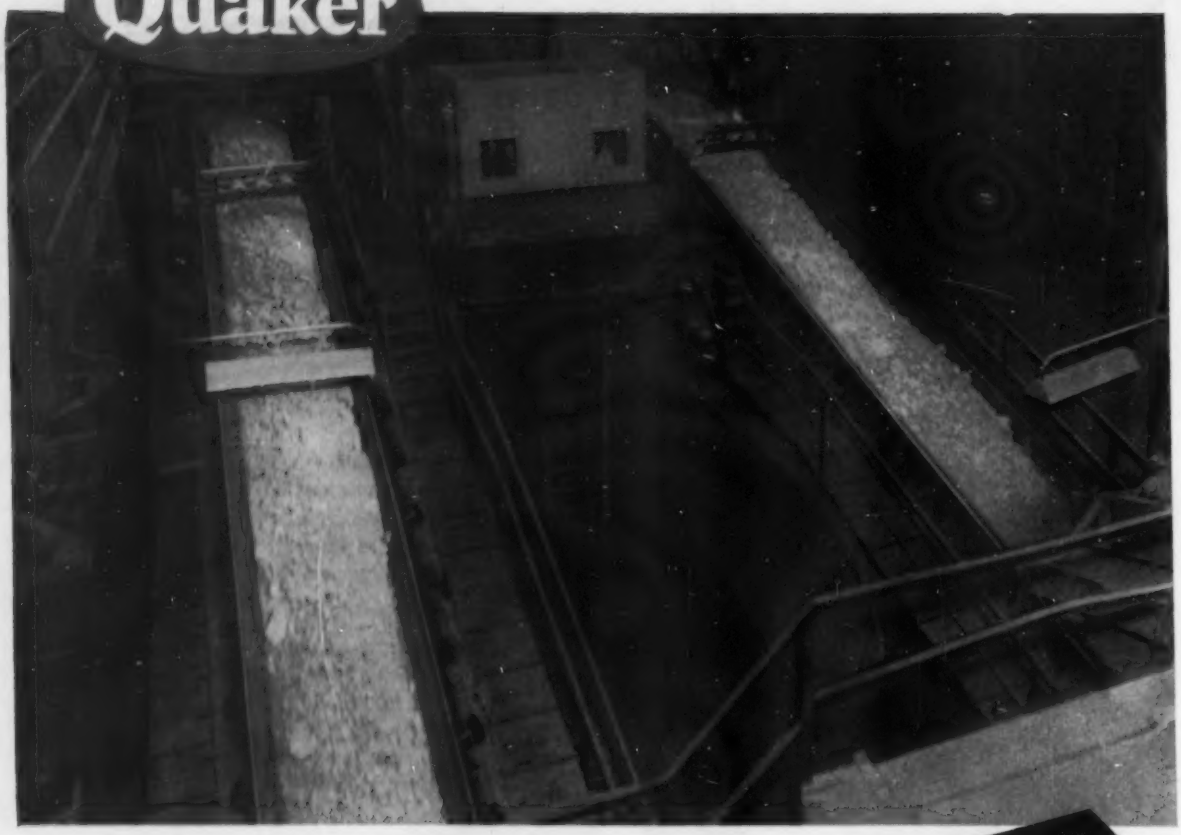

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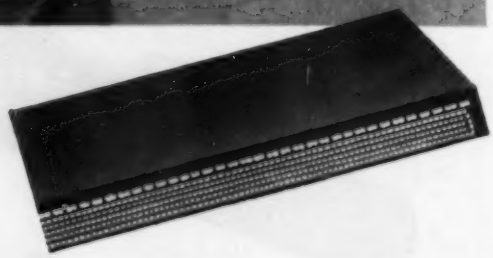

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Caves dredge is expected to exhaust its present ore reserves by the end of this year, and it is the company's intention to let the dredge work into the adjoining Kent Section where ground of suitable depth will provide a further few years' life without dismantling, provided that the dredge (which is of comparatively low capacity), is able to satisfactorily deal with this ground. The ground in the Kent area is expected to be somewhat poorer than in the Batu Caves area and, apart from that, may prove more difficult to work so that the output from this dredge should be expected to fall when it gets into the Kent area.

IRAN—The *Scheelite Company Ltd.* has been formed with Persian capital to develop a scheelite deposit recently located in Persia. Equipment has been ordered, and operations are scheduled to start in 1957. It is hoped that the operation will be able to mine 1,000 tons of ore daily to yield 5 tons of concentrate.

KOREA—The Chang Hang smelter in Kunsan will receive equipment which will almost double the value of some of the ores processed there. The United Nations Korean Reconstruction Agency (UNKRA) has allocated $1,460,000 to modernize the plant. This is expected to reduce smelter costs, permit the processing of lower grade ores, and eventually enable the miners to get more money for their ores. At present, the Chang Hang smelter is Korea's only refinery for treating gold and silver-bearing sulfide ores of copper and lead.

INDIA—*Central Provinces Manganese Ore Company Ltd.* continues its diamond drill program with drills working at *Tirodi, Munsar, Gumgaon,* and *Ukwa* mines. Two holes sunk recently at Ukwa indicated that there might be considerable ore present at comparatively shallow depth. Exploration at the other mines is being undertaken chiefly to prove the beds in connection with the company's open-pit operations at these properties.

CHINA—According to the British Council for the Promotion of International Trade, the Chinese mainland may be offering tungsten to the West by the end of this year. China's target under the current five-year plan is reported to be 30,000 tons of tungsten ore, a 50 percent increase over the 1952 output.

UNION OF SOUTH AFRICA—*Anglo American Corporation of S.A. Ltd.* has commissioned a Dakota airplane equipped with *Hycon Aerial Survey* equipment for geological exploration mainly in the Central African territories.

MOROCCO—A new lead smelting process has been invented by a French engineer, Andre Bertrand, which reportedly makes possible the economic operation of metallurgical plants producing only 1,000 tons of lead annually. Using almost any kind of lead ore, the inventor claims his process can produce lead at 99.6 percent purity at a cost of $42 per metric ton. The new process was perfected by Mr. Bertrand while employed by *Regie des Exploitations Industrielles du Protectorate (REIP)* in Casablanca. The process has been developed by the *Union Africaine des Mines* which built a pilot plant in Casablanca.

TANGANYIKA—Mineral exports in the first four months of this year were valued at £1,890,000, nearly £400,000 more than during the same period of last year. The main increase was in lead concentrates, which totalled £495,000 compared with only £110,772 during the corresponding period of 1955. Exports of diamonds were worth £1,067,560 compared with £1,043,287, and gold exports were £268,382 compared with £294,283.

FEDERATION OF RHODESIA & NYASALAND—*Anglo-Transvaal Consolidated Investment* is to form a Rhodesian company to acquire the sole prospecting and mining rights in the *North Charterland* concession area whose western boundary is the Luangwa River 140 miles east of *Rhodesian Broken Hill* lead-zinc mine. The decision to form this company follows negotiations with *Magundi Copper Mines and Minerals* and *North Charterland Exploration Company.* Magundi last year obtained sole prospecting and mining rights in this area for an unstated period and engaged *Geophysical Surveys (Pty)* of Johannesburg to conduct technical investigations. Exploratory work under Dr. G. L. Paver included the first

mobile scintillometer survey to be made in Northern Rhodesia.

UNION OF SOUTH AFRICA—Good progress with no sinking difficulties reported is being achieved by *Winkelhaak Mines Ltd.* in sinking the two twin-shaft systems, No. 1 and 3. On June 30, 1956, the hoisting component of the latter had reached 776 feet, and the final depth of about 1,500 feet should be reached by year-end, while the Kimberly Reef horizon is expected to be intersected at about 1,150 feet. The hoisting component of the No. 1 system, situated about 5,000 feet northwest of No. 3, reached 664 feet on June 30, and is expected to intersect the Kimberly Reef at about 850 feet. It should reach its final depth of 1,500 feet about the end of the year.

TANGANYIKA—*Mbeya Exploration Company*, formed by *Billiton Maatschappij* which owns 70 percent and *Colonial Development Corporation* which owns 30 percent, has decided to erect a 150-ton pilot plant. The plant will treat ore from columbium-bearing deposits in Panda Hill near Mbeya where the company was granted exclusive prospecting license in 1955. The pilot plant will provide details on the operating efficiency and cost of treatment. Meanwhile, geological examinations and metallurgical research will be continued.

UNION OF SOUTH AFRICA—The *Argent* lead and zinc mine near the Argent siding on the Johannesburg-Witbank railroad has initiated trial plant operations. The treatment plant, with a capacity of 5,000 tons per month, will produce lead and zinc concentrates. The mine is in the *Consolidated Gold Fields* group and is administered by *New Consolidated Gold Fields Ltd.*

BECHUANALAND PROTECTORATE—An exploratory survey of the *Tati Concession Area* has been initiated by *Central Mining and Investment Company, Ltd.* which has acquired an option over the mineral rights in the area. Previous operations in the area have been directed mainly to the development of gold deposits, but activity in recent years has been restricted. Kyanite has also been produced from the area's deposits. The only other mineral product in the Protectorate as a whole during 1955 was asbestos. Recent geological survey operations have also been directed to the Protectorate's copper ore, coal deposits, and a syenite complex.

UNION OF SOUTH AFRICA—*Middle Witwatersrand (Western Areas) Ltd.* has started drilling operations in the Standerton district to the southwest of the Kinross zone, Transvaal, and is proceeding with drilling in the Theunissen district of the Orange Free State.

UGANDA—Work is underway to design and erect a plant at the property of *Sukulu Mines Ltd.* where a large apatite-columbium deposit exists. The plant will have an annual capacity of 100,000 tons of apatite concentrate and 1,000,000 pounds of columbium pentoxide. Associated in this venture are *Frobisher, Ltd., Uganda Development Corporation*, and *Olin Matheson Company*. It is reported that this firm superseded *Tororo Exploration Company* which had been organized by Frobisher, Uganda Development, and *Monsanto Chemical Company*.

ANGOLA—*Companhia Mineira Lusodala, S.A.R.L.* has been formed to prospect for minerals in Angola. Ten percent of the capital will comprise privileged

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shares to be divided equally between the Portuguese Provinces of Angola and Mozambique, and to be delivered free to the Portuguese government within six months. *Companhia Mineiro do Lobito* has signed an additional contract which gives it the right to explore existing mines and those discovered by them within the limits of the concession for an unlimited period. The exclusive prospecting concession expires on December 31, 1957.

FEDERATION OF RHODESIA & NYASALAND—*Cam & Motor Gold Mining Company Ltd.'s* recent returns indicate that a full recovery has been made from the setback at the end of last year when a breakdown in a rock hoist affected the mine's output. The current year's earnings are modestly supplemented by the starting up of the *Pickstone* mine, in keeping with the new £1,000,000 development program which will develop the mine at depth.

UNION OF SOUTH AFRICA—The pilot water-purifying plant which has been under test at *Welkom* treating underground water at the rate of 1,000 gallons an hour has proven successful. It is reported that plans are being considered by the mines for erection of a plant capable of treating 1,000,000 gallons daily. The de-salted water will be used in the uranium plants.

ANGOLA—*Empresa de Cobre de Angola* has been granted exclusive rights for copper prospecting until December 31, 1959. With certain exceptions, it has been agreed that the company will release from exclusive prospecting at the end of each year an area equal to 20 percent of the total area mentioned in Decree No. 38911 of September 13, 1952; 10 percent of the shares issued, or to be issued, will be handed over to the state free of charge. The state is entitled to a 50 percent share of the net profits.

BELGIAN CONGO—*Societe des Mines d'Or de Kilo-Moto* continues to prospect the *Gorumbwa* and *Agbarabo* areas (Moto mines) with favorable results. Over 18,000 meters of borings have already been made. Though the paying reserves of the mines in the Kilo sector were about 1,000 kilograms higher at the end of last year than 12 months previously, the alluvial and eluvial fields were being depleted. The company plans to accelerate the equipment and production of its reefs in order to compensate for the decreasing alluvial and eluvial production.

PERU—*Sindicato Minero Rio Pallanga* S.A. is building a second concentrator to increase capacity from 300 metric tons of lead-zinc ore per day to approximately 500 to 600 tons. A six-foot by six-foot ball mill has been acquired and a small heavy media separation plant is also being added. Axel Nykander is general manager and Alberto Ramirez is superintendent.

MEXICO—*Canamex Mining Corporation Ltd.* has completed its new 125-ton mill at its *La Mojina* property in the state of Chichuhua, and operations are scheduled to get under way this month. A crew of about 100 men are employed in mill construction and blocking out ore underground for mining when milling starts. From present indications, it appears that a reserve of 70,000 tons of mill grade ore is on hand. Some 4,000 tons of ore from development drifts and raises is stockpiled outside the mine ready for milling. C. W. Nash is general manager.

BRAZIL—*St. John D'El Rey Mining Company Ltd.* reports a loss for 1955 of £145,000 as compared with a profit of £100,000 in 1952. The company's main difficulties are attributed to "local" factors not connected with the potentialities of the mine itself. This is quite probable since the ore reserves are ahead of any likely production rates; in fact a few years ago it was decided to sink a shaft so that the mine output could be doubled. The program was halted about the time the shaft reached the 1,000-foot level, because of these "local" factors. Nevertheless, the properties, which cover over 130 square miles, have been thoroughly investigated for their gold, as well as iron and manganese deposits, and it is possible that St. John's management might try to interest some North American mining group in the property.

JAMAICA—*British Ropeway Engineering Company* has received a £550,000 contract from *Aluminum Limited* to provide an aerial tram which will form part of the project for expansion of alumina production. (See MINING WORLD, August 1956, page 78.) A 4½-mile section of tramway with a capacity of 300 tons per hour is to carry bauxite from the mine to the new plant of *Alumina Jamaica* now under construction near Ewarton. At Ewarton, the bauxite will be converted to alumina for transport by sea to the Kitimat smelter in British Columbia, Canada.

PERU—*Marcona Mining Company* is sinking a shaft on its iron ore property near the Port of San Juan. Some drifts are being driven in order to explore lower ore layers. Until now, the project had been entirely open pit. *Utah Construction Company* and *Cyprus Mines Corporation* are partners in Marcona's operations.

COLOMBIA—The world's largest emerald mine, that located at Muzo about 100 miles north of Bogota, is again in operation. Closed since 1949, the mine was reopened in 1954 and today is about 300 feet long, 50 feet wide, and 30 feet deep. Operations are slow and tedious because each foot of ground must be carefully examined since the stones may be found anywhere. The gems range in size from a few carats to as much as 25 carats.

MEXICO—*Freeport Sulphur Company* is reported to be organizing a subsidiary company to operate on the Isthmus of Tehuantepec where the company has sulphur properties. A major reason for Freeport's decision to initiate Mexican operations is said to be the possibility of an increase in taxes on Louisiana sulphur. Negotitations are reportedly underway with the Mexican Economy Minister and the Mexican Mining Development Commission.

COLOMBIA—*Bulolo Gold Dredging, Ltd.* dredged 2,430,500 cubic yards during the three months ended May 31, 1956, to recover 11,112 ounces of fine gold. In this same period of 1955 the company dredged 2,722,500 cubic yards to recover 14,373 ounces of fine gold. The No. 7 dredge sank recently and capsized in its dredging pond at Bulolo following the breaking of the ladder hoist shaft. Damage is covered by insurance.

CUBA—During the three months ended June 30, chrome produced and exported from mines near Baracoa was as follows: *Cayo Guan*—14,215 tons produced and 10,513 tons exported; *Chromita*—2,394 tons produced and 2,105 tons exported; *Delta*—240 tons produced and 1,557 tons exported; *Altagracia*—no production but 148 tons exported.

VENEZUELA—The Ministry of Mines reports the discovery of commercially valuable bauxite deposits in various parts of the state of Boliva in southern Venezuela. Samples reportedly show 40 percent aluminum content with a small amount of silicon and 27 percent iron oxide. The Piar district of Boliva is estimated to contain 10,000,000 tons of the ore.

MEXICO—*Compania Metalurgica Ancira S.A.* has started development of a group of mines located at El Bastan del Cobre, municipality of Huetamo, state of Michoacan. A 100-ton blast furnace has been installed which produces a copper matte assaying 48 percent copper, 37 percent iron, with low contents of gold and silver. A 50-ton flotation mill is also in operation which treats sulphides ores with less than 5 percent copper. In certain parts of the mine, the company is extracting ores running over 18 percent copper, and this ore is sent to the smelter of *American Smelting and Refining Company* at San Luis Potosi.

FRENCH GUIANA—*National Uranium Corporation of Utah* has changed its name to *Industries and Mines Inc.* The firm has a 50 percent interest in *Societe d'Etudes et de Recherches Minieres Inini-Guyane*, which owns a columbite-tantalite concession in French Guiana. National Uranium also holds an option on a gold placer property in French Guiana.

CHILE—The Chilean government's Copper Department estimates that the country's output will increase by 33 percent this year; last year's total was 319,000 tons. The Department says that when the large United States mining companies operating in Chile have completed their expansion programs, expected by 1960, production will be up by another 25 percent.

GUATEMALA—*Mineral Parking Company* of Salt Lake City, Utah, reportedly is sending geologists to Guatemala to explore for zinc, silver, and copper.

NICARAGUA—Supplies for *La Luz Mines* are now being brought in by river and then by road to the mine. Until April the property had been serviced entirely by air. An 18-mile road to the company's *Rosita* copper mine will be completed by the end of the year. Equipment is now being brought in for the new 500- to 600-ton mill, the power plant is being enlarged, and the transmission line to Rosita should be completed soon. Reserves are estimated at 4,000,000 tons of 3 percent copper.

BRAZIL — Aluminum output has reached 6,500 metric tons since the opening of *Cia. Brasiliera de Aluminio's* smelter. Further additions are planned by the company, including a refinery to be constructed near the Paulo Alfonso electric power plants.

PERU—Numerous cobalt discovery claims have been filed in Peru from

various sections of the country, including Cuzco, Ayacucho, Abancoy, and Vilcabamba.

COLUMBIA—*South American Gold & Platinum Company* has acquired a substantial interest (more than 30 percent) in *Frontino Gold Mines Ltd.* through the purchase of stock on the open market. South American Gold advocates a policy of re-investing a substantial part of Frontino's surplus funds in the expansion of its mining operations, and this means that shareholders would receive less dividends for some time. Therefore, Frontino has suggested that South American offer to buy the capital stock of those stockholders who do not wish to retain their interest in the company under new management and financial policies. Negotiations are in progress.

BRITISH COLUMBIA—Results of the major drilling program conducted by the *American Smelting & Refining Company* on the property of *Bethlehem Copper Corporation* in Highland Valley have indicated ore reserves in excess of 100,000,000 tons, according to H. H. Huestis, president of Bethlehem Copper. Recent drilling in the Jersey zone has also indicated a better grade of ore than first estimated. According to Mr. Huestis, drilling has strongly indicated ore to a depth of 650 feet vertically from the surface with no decline in copper content. He reports that ASARCO is planning an operation of not less than 10,000 tons daily. Another group held by Bethlehem, the *Mamit Lake* claims 13 miles south of Highland Valley, are being explored by *Northwestern Explorations*, a subsidiary of *Kennecott Copper Corporation*.

QUEBEC—*Arthur G. McKee & Company's* Canadian subsidiary has been awarded a contract by *Eastern Mining & Smelting Company* for general engineering and construction supervision of a copper and nickel smelter at Chicoutimi. The plant will use the new flash smelting process developed by the Finnish company, *Outokumpu Oy*. McKee recently made an agreement with the Finnish firm for the right to design plants in North and South America using this process. Eastern Mining & Smelting has also obtained additional financing through the J. Bradley Streit-J. A. Hackett interests who have joined the Knight interests *(Mogul Mining Corporation)* on the board of Eastern Mining.

ALASKA—The *Aluminum Company of America (Alcoa)* has leased its limestone claims at Edna Bay to *Edna Bay Pure Stone Company* of Texas. The 27 claims are located on the southern tip of Kosciusko Island. The new firm was organized by Kent B. Diehl, Sr. and Cullen F. McDougal. They plan to quarry and crush the rock; then ship it to a $5,000,000 lime plant to be built near Vancouver, Washington.

ONTARIO—*International Nickel Company* and *Falconbridge Nickel Mines* have agreed to mine jointly a large ore body which extends through both properties. The ore body lies partly in the *Levack* property of International Nickel and partly in the *Fecunis Lake* property of Falconbridge. Engineering staffs of both companies are now working out the details. The deposit will be mined in a block, but other ore bodies in the vicinity will be mined separately by the two firms. Exploration and development of the Fecunis section will be continued under Falconbridge supervision. When stoping operations start sometime in 1958, the work in both sections will be done by Inco. All ore from each company's property will be delivered to that company. Therefore, ore from the Fecunis section will be delivered to the Falconbridge Fecunis Shaft No. 1 by Inco.

BRITISH COLUMBIA—A 500-ton concentrator will be built by *Granby Consolidated Mining, Smelting and Power Company, Ltd.* to treat copper ore which will be mined by open-pit methods at its reopened *Phoenix* mine near Greenwood. The mill is scheduled to start operating during the first half of 1957. Ore to be mined runs about 1.0 percent copper and reserves are estimated at about a 10 years' supply. Concentrates will be shipped to the ASARCO smelter at Tacoma, Washington. The Phoenix yielded 285,000,000 pounds of copper between 1900 and 1919. Granby sold it in 1936 but repurchased it last year and started a diamond drill exploration program last October.

QUEBEC—*Molybdenite Corporation of Canada, Ltd.* has a four-year exclusive

option to purchase stock and develop property of *Preissac Molybdenum Mines Ltd.* Preissac has a molybdenum-bismuth property located about 25 miles north and west of Molybdenite's property in La Conre Township. Of approximately 600,000 tons of indicated ore, 125,000 tons have actually been blocked out. Molybdenite Corporation will conduct a diamond drill program to block out the additional 475,000 tons. Preissac, under the direction of Molybdenite Corporation, may proceed with construction of a 600-ton mill. The molybdenite will be converted into molybdic oxide and molybdates in Molybdenite's converting plant at La Conre, scheduled to begin operations in September. Bismuth will be treated at Molybdenite's smelter.

ALASKA—Canadian interests are reopening the old *Premier* mine at Stewart, British Columbia, just across the boundary from Hyder, Alaska. The Premier mine produced gold and silver many years until it was closed down during World War II. Activity at the mine was noted in July when Robert Velikanje, U. S. Geological Survey geologist, and S. H. Lorain, U. S. Bureau of Mines associate regional director, visited Hyder. They were there to investigate an application of a Defense Minerals Exploration Administration loan. The loan application had been filed for the *Riverside* mine on the Alaskan side of the border, a lead-silver-tungsten producer.

SASKATCHEWAN—*Cayzor Athabaska Mines* expects to begin producing from its uranium mine 1¼ miles from Uranium City by April 1, 1957. Over 1,900 feet of lateral work have been completed on the second level in the mine, and about 4,130 feet on the first level. The shaft is being deepened by two more levels to a depth of 650 feet because diamond drilling established ore continuity both laterally and at depth. A loading pocket for skips will be opened below the fourth level. Cayzor has a contract with the Lorado custom mill now under construction, to supply the mill with a substantial tonnage.

ALASKA—*Sunshine Mining Company* of Wallace, Idaho is reported to be showing a new interest in Alaska's mineral potentialities. James D. Finley is in the Territory on behalf of the firm.

GREENLAND—A Canadian-American group is reported to be in Greenland investigating the possibility of building a port for the trans-shipment of iron ore from Ungave Bay to Europe. Navigation in Ungave Bay is only possible for two or three months each year because of the ice. Therefore, it is proposed to ship the ore to West Greenland during these ice-free months, and then to trans-ship it during the remainder of the year. Two companies are said to be predominantly interested—*International Iron Ore Ltd.* and *Atlantic Iron Ore Ltd.*

ALASKA—*Admiralty-Alaska Gold Mining Company* is undertaking an accelerated exploration program at its *Funter Bay* nickel-copper property. A minimum of 4,000 feet of drifting is to be done in extending an existing drift at the 200-foot elevation and driving a new drift at the 1,000-foot elevation. Exploration so far has been at the 1,425- and 1,700-foot elevations. Both of the proposed openings are expected to intersect the ore body.

ONTARIO—*Stanleigh Uranium Mining Corporation Ltd.* has awarded a contract

to *Dravo of Canada Ltd.* for the sinking of two deep mine shafts near Elliot Lake in the Blind River area. Shaft No. 1 will be four-compartment, and will be sunk about 3,800 feet. Shaft No. 2 will be three-compartment, and will be about 50 feet deep. The collars for both shafts have already been completed by Dravo under another contract.

NOVA SCOTIA—*Mineral Exploration Corporation Ltd. (MINEX)* plans to erect a 150-ton custom zinc smelter on Cape Breton island. Two possible locations are being studied—the Sydney district and the Canso Straits. The company's latest field results from the Rocky Brook and Gold Brook areas have been very encouraging.

ALASKA—A group from Ketchikan known as the *Totem Exploration Company* is prospecting on Bakon Mountain and Prince of Wales Island for metals. Samples taken last year from these areas by prospectors proved to have promising uranium content.

ONTARIO—*Dominion Gulf Company*, a subsidiary of *Gulf Refining Company* which, in turn, is a subsidiary of *Gulf Oil Corporation*, has discovered a major deposit of columbium ore. Preliminary drilling indicates that there may be large tonnages available at the property which is on Nemegosenda Lake 17 miles northeast of Chapleau.

BRITISH COLUMBIA—*Mid-West Copper and Uranium Mines Ltd.* is preparing to erect a mill at the *Velvet* mine near Rossland. Dr. A. G. Pentland is consulting geologist and J. A. Milliken is resident engineer. At Slocan City, the *Ottawa Silver Mining and Milling Company* has completed a 200-foot ventilation raise preparatory to stoping operations. Charles H. Stolz of Spokane, Washington is company secretary.

ONTARIO—Negotiations are underway for *Arcadia Nickel Corporation Ltd.* to purchase a dormant base metal mill which can readily be dismantled and moved to Arcadia's holdings on the Worthington Offset between the *Worthington* and *Crean Hill* properties of *International Nickel Company of Canada*. The Arcadia property is opened by a three-compartment shaft on the Robinson zone to a depth of 972 feet. There are levels at 200, 350, 500, 650, 800, and 950 feet. For the time being, main underground development will be concentrated on the 650 and 800 levels to develop known ore and to explore favorable ground along the Worthington Offset.

BRITISH COLUMBIA—A new company, *Wesfrob Mines Ltd.*, has been formed to develop the *Tassoo* copper-magnetite ore bodies on the Queen Charlotte Islands. *Frobisher Ltd.* is a part owner. Diamond drilling operations are now in progress at the main property, while concurrent field work is being carried out in the same area pending further property acquisitions.

ONTARIO—*Lake Shore Mines Ltd.* has acquired control of *Wright-Hargreaves Mines, Ltd.* a gold mine in the Kirkland Lake area.

ALASKA—A group of lode location certificates have been filed in the area around Fox, Alaska, about 15 miles north of Fairbanks. There is reported to be gold-silver-quartz in the area.

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thereby eliminating them as locales for uranium ion loadings. Nitrate elution cuts down on polythionate poisoning more than does salt-sulphuric acid elution.

RESIN—Water insoluble cross linked polyelectrolytes of high molecular weight. Cross linked polymers in which ionic functional groups have been introduced. They are obtained by amination of a chloromethylated styrenedivinylbenzene copolymer with trimethylamine. They must have high capacity to absorb U_3O_8 completely from leach solution at a reasonable flow rate. Also to absorb uranium preferentially to most of the other leach liquor constituents. For uranium they are strong base anions which selectively adsorb uranyl disulphates and uranyl trisulprates from sulphuric acid leach solutions. Cost from $50.00 to $70.00 per pound and have loading factor as high as 4.0 pounds U_3O_8 per cubic foot.

RIP (RESIN IN PULP)—A process for ion exchange in a desanded acid leach slurry or solution. Adsorption of uranium ions by the resin is accomplished by the solution flowing through a series of banks in which baskets holding a measured volume of resin are moved slowly up and down through the pulp. Multiplicity of ore types treated, plus bentonitic shales in ore horizons which make very difficult settling and filtering of pulps necessitated the development and use of RIP for Colorado Plateau uranium ores. South African production, a byproduct, of gold mining is from ion exchange columns because no filtering problems are encountered from the silicious ores. Canadian practice also uses columns. RIP has the disadvantage of requiring more resin inventory for same throughput than does the columnar method. Resin consumption is also higher.

RESTORATION—Regeneration of poisoned resin by contact with NaOH and Na_2NO_3.

SITE—Exchange position, or place, where ions are attached to the resin.

STRIPPING—Elution removal of uranium ions from loaded resin.

Dawn Mining To Build 400-Ton U_3O_8 Plant

Ford, Washington, 45 miles northwest of Spokane, at the east entrance to the Spokane Indian Reservation, has been selected by Dawn Mining Company as the site for its proposed 400-ton uranium mill. The site is also about 17 miles from the Midnite uranium mine owned by Dawn. The mining firm was formed by Newmont Mining Corporation of New York and Midnite Mines, Inc. of Wellpinit, Washington last year.

Work has started on temporary housing units and a trailer camp for construction workers by Ford Development Company of Spokane. The $3,000,000 plant is scheduled for operation by July 1, 1957.

There have been reports that several mining companies in the area are considering erection of mills for upgrading of uranium ores which would be below the grade accepted by Dawn's plant. Among the firms mentioned are Vitro Uranium Company of Salt Lake City, Painted Desert Uranium and Oil Company of Spokane, and Daybreak Uranium Inc. of Opportunity, Washington.

Harvey Aluminum Resumes Work on $65,000,000 Plant

Harvey Aluminum, a division of Harvey Machine Company Inc. of Torrance, California, has resumed work on its $65,000,000 aluminum reduction plant at The Dalles, Oregon after an interruption of four years. The 54,000-ton plant is scheduled for operation by August 1, 1957.

The company has borrowed $44,000,000 from three banks, and has a guarantee for 93 percent of the loan from the General Services Administration, although company officials have stressed that the project will be entirely financed by private capital.

Work on the plant stopped when difficulties arose in getting electricity for the plant. This situation was remedied when the company agreed last year to provide $2,000,000 for transmission facilities to bring power from the Bonneville Dam's Big Eddy switching station.

Initial capacity is for 54,000-tons annually, but the company plans an increase of 13,000 tons in late 1958. The long-term program calls for construction of a 130,000-ton alumina plant and a second reduction plant of 67,000 tons annual capacity between 1960 and 1963.

Harvey also revealed details of the five-year agreement with Nippon Kight Metals Company Ltd., and Sumitomo Chemical Company Ltd., largest Japanese alumina producers, who will provide 100,000 tons of alumina annually to Harvey. The Japanese alumina will be loaded on special ore cargo ships at Niihama and Shimizu, and will be unloaded at Harvey docks at The Dalles. To provide access for ocean-going carriers, Congress has authorized a navigable depth of 27 feet for the Columbia River through the Bonneville locks to The Dalles.

Deepening of the main shaft at the *Page* lead-zinc mine west of Kellogg, Shoshone County, Idaho has been started by *American Smelting and Refining Company*. The three-compartment, incline shaft will be extended from the 3070 level to the 3400. Production is from the Tony vein between the 2400 and 2770 levels. Development work is under way below the 2770. The Page is the company's largest operation in the Coeur d'Alene Mining Region. J. C. Kieffer of Wallace is manager of the firm's Northwestern mining department.

A labor shortage has cut production by *Sunshine Mining Company* in the same district. Underground shifts this summer have averaged about 285 daily, or about 50 men below normal.

The *Bunker Hill Company* at Kellogg, Idaho has named James B. Bening, Kellogg logging contractor, to succeed Thomas Kinney, timber buyer who has retired after 10 years' service. The Bunker Hill sawmill cuts from 6,000,000 to 7,000,000 board feet of lumber annually.

Senator Silver-Lead Mining Company of Kellogg, Idaho has resumed exploration work at the old *Black Horse* mine east of Murray in the Coeur d'Alenes. A mineralized zone was cut during road construction.

General Mines Corporation is repairing broken windows and equipment damaged by vandals at its mine camp southwest of Kellogg, Shoshone County, Idaho. Some diamond drilling is planned. H. G. Loop of Spokane is president.

Metropolitan Mines Corporation is carrying on mining and milling operations on a small scale at the *Black Bear Silver-Lead Mines'* property north of Wallace, Shoshone County, Idaho. Zinc-lead ore is being hand-sorted in stopes to keep out waste rock.

Autunite (uranium mineralization) has been found at a depth of 15 feet under a low-grade outcropping on the South Fork of the Clearwater River by Walter S. Campbell of Lapwai, Idaho. Extent of the deposit has not been determined.

Articles of incorporation have been filed with the secretary of state at Boise, Idaho for the following mining companies: *Westmore Exploration Company* of Osburn, incorporated by Howard Cameron and William F. Anderson, both of Osburn, and Alden Hull of Wallace; *Bear Valley Dredging Company* of Boise, incorporated by John A. Carver, Jr., Helen Howell, and Ruth Vanderhoof; *Cache Creek Mining Company* of Boise, by Hubert D. Martin, Robert J. McRae, and Charles C. Chaffee, Jr.; *Lucky Gem Mining and Milling Company* of Emmett, by Earl J. Adkins of Emmett, and Ray and Olive Adkins of Pocatello; *Idaho Falls Monument Company* of Idaho Falls, by Lawrence E. and George S. Walker of Pocatello, and Leonard E. Harker of Idaho Falls.

A five-man inspection team of state officials has given the *Porter Brothers'* dredging operation in Bear Valley, Idaho a clean bill of health. The state has been checking closely on dredging operations at the request of wildlife organizations.

Block-leasing operations in old upper workings of the *Sidney* mine near Kellogg, Shoshone County, Idaho have shown a profit ever since they were started more than two years ago. The company is carrying on mining operations on the 1,200 level and doing development work on the new 2,300 level. Malcolm C. Brown is president.

Idaho-Almaden Mine Large Mercury Producer

Rare Metals Corporation of America is mining and furnacing an average of 4,900 tons of mercury ore monthly at its Idaho-Almaden mine near Weiser, Idaho, shown in the picture above. Full details of the new 175-ton per day Gould rotary furnace and mining operations at Idaho-Almaden were presented in the December 1955 issue of MINING WORLD, pages 56 to 60. Through May 31, 1956 production totaled 1,405 flasks which were sold under contract to a major chemical company at an average price of $262.64 per flask. From January to May 19,661 wet tons of ore were mined and 19,596 furnaced. This ore averaged 3.94 pounds of mercury per ton. Operating costs per ton before depletion, depreciation, taxes, and amortization of capital costs were: mining $1.01; furnacing $2.52; and milling loss, overhead, royalty, and property and excise taxes $2.89 per ton. Total operating costs were $6.43 per ton. Stripping overburden which averaged 5.5 feet in thickness was at 1.0 to 2.5 ton ratio and is included in capitalization cost. M. H. Kline is vice president and general manager, E. J. Carlson is division superintendent, and J. R. Reynolds, Idaho-Almaden superintendent.

Mascot Mines, Inc. has lowered the par value of its shares and increased its capital stock so it can seek additional capital to expand its activities. The management is considering reopening its *Little Pittsburg* zinc-lead mine in the Pine Creek district, Shoshone County, Idaho. It also has considerable property in northeastern Washington to explore for uranium with *Sidney Mining Company*. Robert E. Brown of Kellogg is president.

Calera Mining Company has been stepping up production of cobalt at its Blackbird mine, Cobalt, Idaho. Current output is about 200,000 pounds monthly. E. B. Douglas is manager.

MONTANA

Phosphate mining is underway this season at the new *Centennial* mine of *J. R. Simplot Company* near Lakeview, Montana. Stripping is in progress using two 18-yard Euclid scrapers along with two D-9 Caterpillars, three Euclid trucks, and a one-yard Northwest shovel. A 6,300-foot railroad spur has been completed at Lakeview. For the first season the ore is trucked to the railhead (about seven miles), crushed and loaded on rail cars, and then shipped to British Columbia where it will be converted into fertilizer. Phil Peterson is in charge of the mine, while Don Ferguson directed construction of the rail spur.

Key Uranium, Inc. of Conrad, Montana has entered an agreement for development of a four-claim uranium prospect near Basin. The claims were acquired by *Gold Syndicate Corporation* of Spokane, Washington, following discovery of uraninite on an old dump left by early-day gold prospectors. Plans include removal of a cave-in and diamond drilling of tunnel walls. William Inverarity is manager of the operating company.

Mines Prospecting and Exploration Company of Missoula, Montana and *Lincoln Mining Company* of Coeur d'Alene, Idaho, are planning a uranium venture in southern Montana. A program of exploration drilling and bulldozing is to be started as soon as the drilling crew completes other commitments in the Pryor Mountain area. A contract has been signed with the *Minerals Engineering Company* of Grand Junction, Colorado, for the drilling. Earl F. Elstone is president of Mines Prospecting. C. J. Hamilton is president of Lincoln.

Preliminary drilling of an iron ore deposit near Dillon, Beaverhead County, Montana indicates reserves of at least 42,000,000 tons. Tests have shown the iron can be recovered magnetically to produce a 60 to 65-percent iron concentrate with less than 5 percent silica content. *Minerals Engineering Company* of Grand Junction, Colorado, is developing the deposit.

Gilbert Adams, Everett Ballard, Harold Craig, and James Jacobson of Helena, Montana have been granted a prospecting lease on a section of state school land near Augusta in Lewis and Clark County.

Little Rockies Development and Mining Company has completed a 75-ton flotation and cyanide plant on the *Gold Bug* claims near Landusky, Phillips County, Montana. Principal values are gold and silver. Some gallium is also present in the ore.

Thomas P. Sidwell of Billings, Montana and *Commercial Uranium Mines* of Denver, Colorado, headed by Martin Legere,

have jointly purchased about 145,000 shares of the 150,000 shares available in the *New Mine Sapphire Syndicate*. The latter is a British firm which owns the *Yogo* sapphire deposit in Judith Basin County, Montana. The British stopped working the claims because of currency difficulties and double taxation (in the United States and Great Britain). According to a 1952 United States Geological Survey report, this is "the most important gem locality in the United States," and bearing sapphires of highest quality. The new owners plan immediate full-scale production.

The *Umont Mining Company* of Salt Lake City, Utah has taken a lease and option on the *Norwich-Plutus* group of claims in the Butte area of Montana. These claims were formerly operated by a mining partnership of Bob Nelson and Joe Irving. A larger hoist and a steel headframe are being installed on the property and work is progressing on extending the lower level.

Tension Drilling Company is reported to be drilling its recently acquired 79 uranium claims in the Pryor Mountains in Carbon County, Montana.

A. T. Slaveson, Arnold A. Berger, and Robert W. Aveson, all of Billings, Montana, have incorporated *Crusade Corporation* for development of mineral lands.

OREGON

More than 25,000 tons of nickel ore mined in southwest Oregon have been stockpiled at the Port of Stockton, California this summer awaiting shipment to Santa Rosalia, Mexico. The first shipment left early in August carrying 5,000 tons for the smelting furnaces of *Compania Minera Santa Rosalia*.

Mercury-Chemicals Corporation is rehabilitating the old *Black Butte* mercury mines about 20 miles southeast of Cottage Grove, Oregon. Exploratory drilling is also underway. An old Gould furnace on the property is being modernized and the firm expects to go into production sometime in November. Of the five miles of underground workings from previous operators (the mines were first opened in the 1890's), only the 1100 level has been reopened at this time. An air compressor has been installed on this level and is running the drilling machinery. A coarse ore bin is also under construction. Richard F. Fischer is president of the firm, Herbert J. Larsen, superintendent, John E. Johnson, foreman-in-charge. Daniel J. Mills, president of *Quicksilver Syndicate*, the firm which is leasing the mines to Mercury-Chemicals, has also been taking an active part in the rehabilitation program.

H. K. Riddle of Payette, Idaho has been granted a DMEA loan for prospect exploration on a quicksilver property he has been leasing since last fall. The property is owned by the Jordan brothers of Vale. Present plans call for drilling on the north and northwest sides of Hope Butte, which is in the Bully Creek area of Malheur County, Oregon.

Great Lakes Carbon Company is exploring a diatomite-bearing area in Otis Basin, Harney County, Oregon.

WASHINGTON

Universal Mining Corporation of Spokane is planning to explore the 5,000-acre holdings of *Taylor Land and Livestock Company* north of the Spokane Indian Reservation in southwestern Stevens County, Washington. The land is interspersed with uranium leases of *Phelps Dodge Corporation*. Cline E. Tedrow, Spokane consulting mining engineer and former production foreman for *Pend Oreille Mines and Metals Company*, Metaline Falls, is president.

Recent filers of mining claims in Stevens County, Washington included E. M. Nelson and L. H. House, Spokane; J. A. Ledford, R. E. Mast, Ray H. Wiley, James W. Heritage and W. E. Mast, all of Northport; Hugo E. Lundstrom, Fruitland; and Gordon LeVigne and Ole Alm, Chewelah.

North Star Uranium, Inc. at last report was diamond drilling its *Sherwood* permit area adjacent to the *Midnite* mine on the Spokane Indian Reservation, southwestern Stevens County, Washington. David M. Berry, geologist formerly with *Anaconda Company*, Butte, Montana, is in charge. A. C. McKelvie, Spokane and Calgary, is company president.

Daybreak Uranium, Inc., Spokane, has shipped its 100th freight car of ore from the *Daybreak* mine in the Mount Spokane

district, northern Spokane County. Recent cars averaged 0.44 percent uranium oxide. Although 2,000 tons of ore were stockpiled at the Daybreak, the company planned to make next shipments from the *Huffman* and *Kit Carson* leases in the same district because of their eligibility for initial discovery bonuses. Kae Sowers is secretary.

The *Togo, Turk,* and *Deer Trail* copper-silver mines near Fruitland, southwestern Stevens County, Washington, have been purchased by *Intermountain Petro-Mining, Ltd.* of Calgary, Canada. Initial plans include geological mapping, metallurgical studies, and renovation of old workings in preparation for an exploration program. Ore reserves reportedly will be mined and treated in the Deer Trail flotation plant. W. Howard Myers, Calgary geophysical consultant, is in charge.

General Uranium, Inc. of Spokane, Washington has started stripping operations in the Spokane Indian Reservation uranium field of southwestern Stevens County. James L. Simpson, Coeur d'Alene, Idaho, is president.

Northwest Uranium Mines, Inc., at last report, had drilled about 30 percussion drill holes on its holdings in the Spokane Indian Reservation, southwestern Stevens County, Washington, under a $29,160 DMEA contract. The drilling is to delineate ore zones disclosed by previous bulldozer trenching and drilling. Dr. F. E. Scott of Wallace, Idaho is company president.

Tri-Sun Mining Corporation of Spokane has been formed to explore for uranium on the Van Megan farm in the Mount Spokane district, northern Spokane County, Washington. M/Sgt. Robert K. Urban of Fairchild Air Force Base; Fred Nelson of Moscow, Idaho; and E. V. Swank of Clarkston, Idaho, are the incorporators.

A trailer house and pack horses have been added to prospecting equipment of *Highnoon Uranium Mines, Inc.,* Newport, Pend Oreille County, Washington. J. Fred Williams has been retained as consulting geologist. Field operations are directed by C. N. McJunkin, company president. Charles Pulford is secretary.

The Spokane Field Office of the United States Bureau of Mines is undertaking two new projects—a field study of Northwest titanium placers and construction of a more advanced model of a phosphate planing machine tested at a Montana phosphate mine. Wing G. Agnew is chief of the office.

The high silica Lyons Hill sandstone deposit near Springdale, Washington, is now producing pit run material for shipment to *The Carborundum Company* at Vancouver, Washington. The property is leased to *Exploration & Development Associates* of Los Altos, California. *Del Monte Properties Company,* producers of Del Monte sand at Monterey, California, have secured an option from Exploration & Development Associates and are investigating the feasibility of constructing a plant in the Northwest to produce finished sand products to the glass, foundry, and silicon carbide industries. General manager of Exploration & Development Associates is Ott F. Heizer who was general manager of the *Nevada Massachusetts Company* at Mill City, Nevada, from 1925 to 1944, and has been associated with many other mining enterprises in California and Nevada. According to Mr. Heizer, Exploration & Development Associates was formed primarily to investigate and evaluate new prospects and bring the worthwhile properties to the attention of operating mining companies.

U & W Uranium Company is drilling a uranium showing in the Orient district of northern Stevens County, Washington. A better access road has been built. S. E. Salter of Spokane is secretary-treasurer.

Diamond drill exploration of a uranium prospect in Beaver Valley, seven miles west of Newport, Pend Oreille County, Washington, has been undertaken by *Kimball Mines, Inc.* S. L. Stratton, Spokane, is president.

Jack Morgan, Dick DeRosier, and Walter Hagen of Spokane, Washington are developing a showing of yellow autunite crystals in decomposed granite on mining claims staked in the Skookum Lake district of Pend Oreille County.

Sixteen new reduction cells have been installed at *Kaiser Aluminum and Chemical Corporation's* Mead plant in Spokane County, Washington at a cost of $300,000. The additions boost capacity by about 3,000,000 pounds of primary aluminum annually to 352,000,000 pounds. A. F. Garcia is works manager.

Clifford Brisbois and Everett J. Nesbitt, Spokane; Alfred L. Brisbois, Cheney and Joe Brisbois, Miles, have incorporated *Chief Garry Uranium, Inc.,* to develop autunite and scheelite showings on leased land in the Spokane Indian Reservation, southwestern Stevens County, Washington.

Midnite Mines, Inc. of Wellpinit, Washington is prospecting 4,000 acres along the northern border of the Spokane Indian Reservation under an agreement with Lloyd F. Johnson of Spokane. Clair Wynecoop of Wellpinit is company president.

Kit Carson Uranium, Inc. has concluded an operating agreement with *Daybreak Uranium, Inc.* and *Yukon Oils, Ltd.* to open and mine ore bodies indicated by drilling on Kit Carson holdings in the Mount Spokane district of Washington. The land is about one mile southeast of the Daybreak uranium mine. Max Etter, Spokane attorney, is president of Kit Carson.

Consolidated Natural Minerals, Inc. of Philadelphia, Pennsylvania, has leased nine claims in Ferry County, Washington's Orient mining district from two uranium prospectors, Alvin and Victor Van Horn.

Sunburst Uranium Mining Company has been incorporated by Arnold F. Larsen, A. C. Townsend, and others to take over claims and leases in the Chewelah area of Stevens County, Washington.

Devil's Gap Uranium Company of Spokane, Washington has been incorporated with capitalization of $500,000 by Vern Holstron of Rockford, and T. H. Collier and Elwin F. Collier of Veradale.

A Yakima, Washington mining firm, *Conley-Fackler, Inc.,* has been incorporated by Carl and Hal Fackler of Yakima and J. N. Conley of Portland, Oregon.

Painted Desert Uranium and Oil Company has completed a $120,000 public stock offering. It is carrying on exploration for uranium both in the Spokane area and near Moab, Utah. W. M. Fredericks is secretary-treasurer.

William Richard and George Weaver, Spokane, Washington have organized *Mine Consultants, Inc.* to provide geological and engineering services.

Vitro and Four Corners Make Uranium Agreements

Vitro Corporation of America and Four Corners Uranium Corporation have concluded a long-term agreement covering the field of uranium ore mining and processing. Principal part of the agreement is a contract whereby Four Corners will ship uranium ore from its mines near Green River, Utah to the Salt Lake City mill of Vitro Uranium Company.

The contract provides that Four Corners will start by furnishing a minimum of 3,000 tons of ore per month and may increase to a maximum of 12,000 tons. The value of the ore concerned, until the expiration date of the AEC purchase contracts on March 31, 1962, will amount to $5,100,000 at the minimum and more than $20,000,000 at the maximum.

The agreement extends as long as Vitro operates the Utah mill and Four Corners has minable ore bodies. It is expected to be of great importance to both firms for it provides Four Corners with a steady market for its uranium ore and furnishes Vitro with good quality ore for processing. A large expansion is planned at the Vitro mill; a new solvent extraction process is being installed to replace the present process which has been in operation since 1951.

Four Corners has a large number of holdings as well as a number of interests and affiliations with other companies in the uranium field. Among its various holdings, those at Green River are among the most important. They cover more than two miles along the east flank of the San Rafael Swell of east central Utah. A few miles south are the Grande, April and Lucky Squirrel claims, considered part of the group. Adjacent are the Uranium Prospectors claims which belong to Vitro.

Speakers Set for Rocky Mountain Minerals Meet

While only three years old, the Annual Rocky Mountain Minerals Conference held every fall in Salt Lake City, Utah has developed into one of the most important technical meetings of the year. Outstanding industry papers each year have meant high prestige for the meeting and brought many compliments to the Utah Section of the AIME which sponsors the meeting.

The technical program for this year's meeting to be held at the Newhouse Hotel on September 26, 27, 28 will again feature outstanding experts. On opening day, Wednesday the 26th, J. Stanley Mitchell, plant superintendent, Calera Mining Company, Garfield, Utah, will talk on Calera's Pressure Leaching and Reduction; Robert L. Loer, superintendent of the Desert Mound mine, Columbia Iron Mining Company, Cedar City Utah, will outline mining methods; and Charles Sweetwood, staff engineer, J. R. Simplot Company, Boise, Idaho, will tell of his recent experiences mining Israel phosphate.

Thursday's papers include: Geology of Uranium Deposits at Ambrosia Lake by R. G. Young, geologist, United States Atomic Energy Commission; Mining at Idaho-Almaden Mercury Mine by J. R. Reynolds, chief engineer, Rare Metals Corporation of America; Production of Titanium Metal at Henderson, Nevada by R. R. Lloyd, superintendent, Titanium Metals Corporation of America; New Methods of Mining Gilsonite by John H. Baker, American Gilsonite Company; and a symposium on uranium metallurgy.

Friday morning, the Loading and Transportation symposium will be held with field trips in the afternoon to Calera Mining Company's Garfield cobalt refinery; the phosphate fertilizer plant of Western Phosphate Company at Garfield; and the Vitro Uranium Company's mill.

For further inforamtion and reservations, please contact R. B. Coleman at 600 West 33rd South, Salt Lake City, Utah.

COLORADO

Climax Molybdenum Company at Climax, Colorado has purchased a minority interest in *St. Anthony Uranium Corporation* from *St. Anthony Oil Corporation*. The purchase is reported to make St. Anthony a wholly owned subsidiary of Climax. The St. Anthony uranium property is in New Mexico north of *Anaconda Company's Jackpile* mine.

Union Carbide Nuclear Corporation is building an ore concentrator near the Dolores River at Poverty Flat, San Miguel County, Colorado. *Catalytic Construction Company* of Pittsburgh, Pennsylvania has the contract for the $750,000 job. The concentrator will use a new process developed by the Union Carbide research department. The upgrading is expected to give a degree of concentration which will greatly cut the present high cost of moving uranium ore from mine to mill.

The Atomic Energy Commission has revealed that total United States output of uranium ore is approaching 3,000,000 tons a year, with an increase to 5,000,000 or 6,000,000 tons expected. While ore production exceeded processing capacity in the period from January to June of this year, completion of new mills now under construction or planned will reduce stockpiles to normal operating inventories. Reserves in producing areas have been estimated at 30,000,000 tons, and indicated or inferred reserves have been set at another 30,000,000 tons.

Golden Cycle Corporation produced 4,251 tons of uranium ore in the first five months of 1956 from its properties on Atkinson Mesa, Montrose County, Colorado. During the same period of 1955 the company produced 3,058 tons.

The *Burke-Martin Mines, Inc.* at Montezuma, Colorado has erected a 50-ton flotation mill at its silver-gold-lead property and the mill is operating on a 24-hour basis. Concentrates are shipped to *American Smelting and Refining Company* smelters at Leadville and Amarillo.

The *Bald Eagle*, operated through the Two Brothers Tunnel in Virginia Canyon,

Aerial Photogrammetry for Bingham Canyon

Kennecott Copper Corporation's Utah Copper Division has turned to aerial photogrammetry for a precise map of its mining levels in the Bingham Canyon copper mine. Until recently, ground engineers surveyed the pit with transit and level to obtain the measurements needed for an accurate map. This took several months to complete and was not up-to-date when finished because mining had been steadily going on in all of these surveyed areas. Aero Service Corporation's branch in Salt Lake City, with its staff of pilots, photographers, laboratory technicians, and photogrammetrists, was given the job of producing pit maps from aerial photographs. The photograph above shows, in part, what they can achieve. This picture is looking straight down into the heart of the 972-acre pit. The various mine levels can be determined easily. The flight crew makes several runs over the mine taking a series of pictures. Each photo covers 60 percent of the area filmed in the previous photograph. These overlapping photographs, when shown in a lens stereoscope, give a three-dimensional effect of the area. The finished map, made from these photographs, gives up-to-date locations of the shovel benches, enables easy plotting of ore locations, and makes it possible to determine the quantity of stripped ore reserve—all in a matter of a few weeks instead of months.

is now a steady shipper of gold-lead ores. Milling is being handled at the Front Range mill in Dumont, Colorado. A recent concentrate shipment of 60 tons to the smelter netted over $15,000. The company recently bought 80 acres for a mill site along the Clear Creek half a mile below Idaho Springs and may erect a mill.

A Bureau of Mines report entitled "Tungsten Potential in Chaffee, Fremont, Gunnison, Lake, Larimer, Park, and Summit Counties, Colorado," has been released. It describes the tungsten-bearing areas in these seven counties and estimates inferred reserves, excluding the *Climax* mine, at approximately 45,000 tons of ore containing 0.81 percent tungsten trioxide.

The *Radical* manganese mine owned by I. A. Taylor of Leadville, Colorado has been leased to L. R. Ringwald and W. A. Jones of Canon City. They will start work immediately.

Don Joslin and associates of Denver, Colorado have taken over placer gold claims along Clear Creek about 3½ miles below Idaho Springs. New equipment drills and trommels are now being installed. The property was operated some 10 years ago and, when abandoned because of a management disagreement, the old machinery was left on the ground. However, this has since deteriorated beyond use.

The *American Congress on Surveying and Mapping* and the *American Society of Photogrammetry* will hold a joint fall convention and co-exhibit at the Shirley-Savoy Hotel in Denver, Colorado September 30 through October 2.

SOUTH DAKOTA

Homestake Mining Company is abandoning the practice of shrinkage stoping in its *Homestake* mine at Lead, South Dakota after many years, and will replace the technique with open cut-and-fill stoping. The company explains that as the mine gets deeper there is greater rock pressure and the large shrinkage stopes with walls standing unsupported are not as safe as cut and fill stopes.

Silver Pick Uranium Inc. has acquired 13 claims in the Tee Pee area of the Black Hills, Fall River County, South Dakota. The claims were owned by the *Uranium Research and Development Company* of Denver, and are located 13 miles from Host Spring near the *Gould* mines in Edgemont.

Mines Development Inc., has dedicated its newly completed uranium ore processing plant at Edgemont, South Dakota. Ownership of the buying station at Edgemont, formerly operated by *Lucius Pitkin, Inc.*, has been transferred to Mines Development.

The suboffice of the *United States Atomic Energy Commission* at Hot Springs, South Dakota has been moved to Rapid City where it is now located in the *United States Geological Survey* building on the campus of the *South Dakota School of Mines*. The Rapid City AEC office will handle all phases of exploration for the AEC in both Dakotas and sections of the Black Hills which extend into eastern Wyoming. It will also provide administrative and technical headquarters for the field geologists working in scattered areas all over the western Dakotas.

The *United States Geological Survey* has published a report on the occurrence of carnotite in the Cedar Canyon area of the Slim Buttes, Harding County, South Dakota. The report describes the Tertiary geology of the canyon area where as much as 0.23 percent uranium occurs in sandstones of the Chadron formation of Oligocene age. The uranium is thought to have been leached and transported by ground water from the overlying tuffaceous rocks of the Arikaree formation of Miocene age. Copies may be obtained from the Superintendent of Documents, Washington 25, D.C. at 35¢. It is published as a Geological Survey Bulletin 1009-I.

UTAH

Standard Uranium Corporation reports that its crews have encountered an ore body on its *Big Buck* claims adjoining

the *Mi Vida* mine of *Utex Exploration Company* in the Big Indian district of Utah. A number of exploratory headings are being started to determine extent of the deposit.

A part of the *Garfield Chemical and Manufacturing Corporation's* expansion of sulphuric acid output is the construction of a fifth plant which will add more than 30 percent to the sulphuric acid output at Garfield, Utah. In conjunction with this, an additional 9,000 tons of storage facilities are being erected at the Garfield Chemical tank farm at Thompson, Utah. The tank farm was first placed in operation in January 1956 to serve tank truck customers (uranium mills) in the western portion of the Colorado Plateau. This has required the leasing of another 60 railroad acid tank cars for this service. Garfield is a jointly owned facility of the *American Smelting and Refining Company* and *Kennecott Copper Corporation.*

Silver Dollar Mining Company of Spokane, Washington has located claims adjoining its recently purchased *Fry Mesa* uranium property about 50 miles west of Blanding, Utah. The firm's holdings now cover more than 900 acres. The ground is being test-drilled. Elmer E. Johnston, is president.

Federal Uranium Corporation of Salt Lake City, Utah is reported to have loaned $150,000 to *Radio Geophysical Company* of San Antonio, Texas over a three-year period to explore for uranium in the Blanding area of San Juan County, Utah. Federal holds an option to become operator of any property Radio Geophysical might find.

Exploratory drilling on the *Hot Rock* claims adjoining the *Radon* uranium mine in San Juan County's Big Indian district, Utah has indicated limited amounts of ore in two widely separated areas. *Hecla Mining Company* of Wallace, Idaho is doing the work under an operating agreement with *Federal Uranium Corporation.*

North Range Mining Company, with numerous iron ore properties in Michigan, is reported to be examining the *Newhouse* copper properties near Milford, Utah.

East Utah Mining Company has acquired the lead-silver-zinc properties of *American Fork Consolidated Mines Company* in American Fork Canyon, five miles southwest of Park City, Utah. An agreement between the two firms provides for an exchange of 320,000 shares of stock plus payment of about $20,000. Intensive geologic surveys are underway.

A preliminary report on the results of a recent geochemical prospecting study and a test drilling project in the Trixie area, East Tintic district, Utah has been released for public inspection by the United States Geological Survey. The *Trixie* area is about 1⅛ miles southwest of the famous *Tintic Standard* mine in Utah County, Utah and includes unexplored and undeveloped portions of such well-known properties as *Eureka Standard*, *South Standard*, and *Eureka Lilly Consolidated.*

Utah Grand Inc. of Reno, Nevada is drilling the *Tim Auxiliary* and *Tim Auxiliary Extension* claims in Hell Roaring Canon, Grand County, Utah, where favorable uranium mineralization has been found. The company has built about four miles of road into the area and has uncovered some ore by bulldozing a hillside. The property is about six miles from

the high-lime mill of *Universal Uranium and Milling Company*.

National Uranium Corporation of Utah has changed its name to *Industries and Mines, Inc.* in order that it would more properly describe the scope and extent of the firm's operations.

A group of Spokane, Washington men have organized *Spokane Falls Uranium Company* to develop a 35-claim group in the Cisco Wash area north of Moab, Utah, and a 20-claim group in Moki Canyon southwest of Blanding. Frank I. McCormick is president; Lloyd E. Koehler, vice president, and John C. Wardrop, secretary.

WYOMING

Operators who shipped uranium ore from Fremont County, Wyoming during 1955 are shown below:

Operator	*Tonnage Shipped*
Vitro Minerals	10,036
Globe Mining	6,658
Lucky Mc Uranium	5,485
Savannah Construction	2,990
Cheyenne Mining & Uranium	1,947
Wyoming Uranium	1,626
Little Mo Mining	1,447
Noramco Associates	1,082
San Juan Uranium Exploration	640
Kerr-McGee Oil Industries	213
Split Rock Mining	116
McAlester Fuel	35
Antelope Mines	10

Phelps Dodge Corporation has recently contracted with the *Colorado Exploration Company* of Golden, Colorado to assist its geologists and engineers in supervising the exploration of *Wyoming Uranium Corporation's* holdings in the Crooks Gap district, Fremont County, Wyoming. The present program calls for at least 68,000 feet of drilling. In addition, Colorado Exploration Company is performing engineering services for Phelps Dodge Corporation on the *Mile High Minerals'* claims located in South Dakota and Wyoming. Colorado Exploration Company is headed by Charles E. Melbye and Stuart S. Merwin.

The *Aloha* group of nine claims in the Gas Hills district of Wyoming is scheduled for exploration by *Key Uranium, Inc.* of Conrad, Montana, under an agreement with *Gold Syndicate Corporation* of Spokane, Washington. William Inverarity is manager of the Conrad firm.

At last report, *Phelps Dodge Corporation* was coring at 1,750 feet in a deep test hole on the *Mile High Minerals Corporation* uranium claims it is operating in the Crooks Gap area. Phelps Dodge is attempting to drill the hole to 2,500 feet as a straigraphic and wildcat deep ore test.

The *Mineral Sands Company* of Lansing Michigan is conducting an extensive drilling and testing program on a large, low-grade uranium deposit near Lander.

The *Union Pacific Railroad* and *American Smelting & Refining Company* have entered into an agreement whereby ASARCO is to explore some 4,800 square miles of the railroad's lands in Wyoming for uranium. The mining company is preparing to send large aerial and ground crews into the field.

In a meeting at Grand Junction, Allan Jones, manager of the Grand Junction operations office of the AEC, told Wyoming representatives that the AEC will continue to buy ore at the Riverton (Wyoming) buying station at the present 12,000 to 15,000 tons per month rate. Mr. Jones also said the station would be kept open indefinitely and that the AEC would endeavor to insure a market for Wyoming ore until such time as mills are able to absorb all production. AEC representatives had informed Gas Hills uranium producers in July that all quotas would be drastically reduced when announcement was made of two processing mills for central Wyoming. The AEC also said it was going to close the Riverton buying station and turn all ore buying over to private companies operating the mills. Numerous companies said they would have to close down operations if quotas were sharply reduced. The uranium mills would be able to handle only a portion of the central Wyoming production. Representatives meeting with Mr. Jones were from the recently-formed Wyoming Mining Association, the Riverton Chamber of Commerce and the Governor's Minerals Committee.

Extensive sampling of an iron deposit in the Lander, Wyoming area has been completed by *Columbia-Geneva Steel Company* of Provo, Utah. The samples were shipped to the *Oliver Iron Mining Division of U. S. Steel Corporation* at Duluth, Minnesota, for evaluation. The deposit is being considered as part of the development of lower grade iron deposits in the country. Also involved in the work have been the *J. R. Simplot Company*, of Boise, Idaho, and a subsidiary, the *Ruby Corporation*.

The Wyoming tungsten mining and milling operation of *Warren Oil & Uranium* of Fort Worth, Texas has been closed down temporarily with halting of the government buying program. The firm was mining in the Hoodoo Creek area in the Copper Mountain section of central Wyoming and trucking the ore to the Pioneer Carrisa mill near South Pass City. H. W. Wrentmore, company president, said operations will be resumed if the government buying program is continued.

Alfred Ellerby, president of *Vipont Mining Company*, has reported that his firm has negotiated a lease with Walter Knollenberg whose ranch comprises one of the largest blocks of free land within the Wind River Indian Reservation in Wyoming. The lease covers 4,480 acres of deeded land in the northwest corner of the reservation. Mr. Vipont plans to launch a large-scale prospecting and drilling program for uranium. Preliminary prospecting reportedly already has revealed large radioactive zones. The reservation, comprising 2,000,000 acres, was recently opened to uranium prospecting. Although a number of applications for prospecting permits have been filed with the tribal realty office at Fort Washakie, no permits have been issued on tribal land.

A large tonnage of uranium ore has been blocked out in one ore body on the *Bullrush* claims operated by Savanna Construction Company in the Gas Hills area of Wyoming.

ODM To Encourage Nickel Output by Premium Prices

To encourage expansion of nickel production both in the United States and abroad, the Office of Defense Mobilization will now pay premium prices covering production costs. The General Services Administration will work with individual companies in determining prices in each case.

At present the GSA allows fast amortization of nickel plants for tax purposes. It also makes market-price purchase contracts with companies willing to expand. Under this new program, the government will enter into a contract with a company guaranteeing a premium price for the metal "to cover unusual development costs." This metal could be sold to the government at this price each quarter at the company's option, or the government could require that the company sell a certain amount each quarter.

Besides aiding domestic companies, the new program would also assist foreign firms which do not pay U.S. taxes and therefore are not concerned with fast tax amortization.

Current nickel supply available to the United States is around 300,000,000 pounds annually. By 1961 the government hopes to have 440,000,000 pounds available annually. Most of this metal comes from Canada and Cuba, with only about 15,000,000 pounds produced in the United States.

Several expansion projects are already under way. Bethlehem Steel Company and Freeport Sulphur Company are studying a process for extracting nickel from low-grade Cuban ore. Studies recently completed by the government show that the Philippine Islands may be a large source of supply in the future; however, it will probably be at least five years before any great amount of nickel would be available from there.

American Zinc, Lead & Smelting Company's Temperly mine at Cuba City, Wisconsin went into operation on August 1. Present development plans call for production from the *Thompson* property adjoining the Temperly before the end of this year. At the firm's *Coy* mine in Tennessess, there has been some delay in delivery of electrical equipment and steel for the headframe. This mine is now scheduled for operation by the first quarter of next year.

At the request of the Office of Minerals Mobilization, the United States Geological Survey is making a nationwide survey of fluorspar ore reserves. Geologists have recently been in the Illinois-Kentucky area.

The University of Minnesota, through the cooperating services of the School of Mines and Metallurgy of its Institute of Technology and the Center for Continuation Study, will present the sixth annual symposium in the drilling field on October 11, 12, and 13. The program this year will depart somewhat from the previous discussions of exploration drilling and will consider production drilling and blasting.

The *Lithium Corporation of America, Inc.*, with headquarters in Minneapolis, Minnesota, has completed the first phase of its expansion program for the production of lithium metal and its derivatives for use in the field of high energy chemical fuels. The rapidly increasing industrial demands for lithium and its derivatives will require further expansion of these facilities in the immediate future, reports the company.

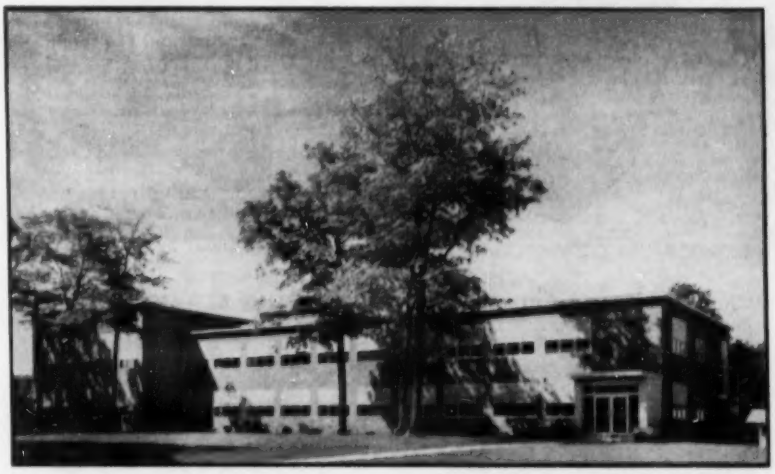
DuPont Company has acquired a 10,500-acre tract near Brevard, North Carolina and reportedly plans to build a silicon plant there. The property lies on the boundary line between two counties —Transylvania and Henderson—and is roughly bisected by Little River. Three large parcels are included: the Buck Forest tract consisting of about 5,000 acres and owned by the Frank Coxe family; the A. H. Guion tract of 5,400 acres; and the Donald Roads tract of 139 acres. It is expected that the actual plant site will be on the Frank Coxe tract. The North Carolina Highway Commission is said to have agreed to build roads into the plant site. The company will mine silica to produce silicon for its solar cell batteries.

A $7,000,000 primary magnesium plant will be built by *Alabama Metallurgical Corporation* at Selma, Alabama. The firm was recently organized by *Brooks & Perkins Inc.* of Detroit, Michigan and the *Dominion Magnesium Corporation* of Toronto, Canada. Options have been acquired on 480 acres on the Alabama River, about 50 miles west of Montgomery. The proposed plant is expected to be in operation by the end of 1957, with an initial rate of 10,000 tons of "high purity" magnesium annually. This will increase commercial capacity of the United States by nearly 15 percent. The Alabama site was selected after two years of geological survey because of the "virtually unlimited" supply of dolomite.

Tennessee Copper Company's new hydrosulfite plant is nearing completion at Copperhill, Tennessee. Production is expected by the end of the year.

The Northeastern Mining Branch Conference will take place at Hershey, Pennsylvania on November 8 to 10, with the Lehigh Valley Section of the AIME serving as host. In addition to the technical sessions on mining, geology, geophysics, industrial minerals, and concentration, there will be field trips to the *Cornwall* mines and the Lebanon concentrating plant of *Bethlehem Cornwall Corporation, Millard Lime & Stone Company*, and the famous charcoal furnace built in 1743.

The General Services Administration has extended the defense production programs on manganese, mica, and beryl. The manganese program has been extended from June 30, 1958 to January 1, 1961, and the purchase ceiling raised from 19,000,000-long-ton units to 28,-



Michigan Dedicates New Ores Research Building

The new Ores Research Building (above) of the Michigan College of Mining and Technology at Houghton, Michigan was dedicated in August. Built and equipped at a cost of $750,000, the building is Michigan's first state-supported laboratory for research on uses of low-grade Michigan ores and other minerals. It includes 423,000 cubic feet of laboratories, offices, and pilot plant, and will serve as headquarters for the college's Bureau of Mineral Research. Keynote speaker was Grover J. Holt, general manager of the ore mining department of Cleveland-Cliffs Iron Company. Also on the program were Dr. Grover C. Dillman, president of Michigan Tech, and M. E. Volin, director of the college's Bureau of Mineral Research. Mr. Volin received the honorary degree of Doctor of Engineering from Michigan Tech at the ceremonies. Although geared primarily for research on copper and iron ores, the Bureau will consider research on any other problems involving such minerals as dolomite, limestone, salt and brines, oil and natural gas. One of the most pressing problems affecting the Michigan mining industry is the existence of hundreds of millions of tons of iron bearing formations in Iron, Dickinson, Gogebic, and Marquette counties containing at least 25 percent iron. These deposits cannot be mined economically until new methods are discovered for separating the ore from the useless materials.

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000,000, the termination of the program to occur whichever is reached first. The period of participation has been lengthened from June 30, 1956 to June 30, 1958, and this is known as the carload program. The mica program has been extended from June 30, 1957 to June 30, 1962, with no change in ceiling. Participation period has been lengthened from June 30, 1956 to June 30, 1958. The beryl program has been lengthened from June 30, 1957 to June 30, 1962. The limitation on deliveries has lifted from 1,500 short dry tons to 4,500 short dry tons, termination to occur whichever is reached first. Period of participation has been lengthened from June 30, 1956 to June 30, 1958.

Horizons, Inc. has received a $200,000 development contract from the Navy Bureau of Aeronautics which provides for one-year of development work on a commercial method for producing titanium by an electrolytic process. Horizons is supposed to have a process which it claims will produce titanium at significantly less cost than the present Kroll method. If the new process proves commercially feasible, it will be carried out by *Horizons Titanium Corporation* of new York, a Horizons licensee. The new process produces titanium in the form of coarse granules, rather than sponge.

Over $500,000 will be spent on improvements and additions to *Foote Mineral Company's* spodumene plant at Kings Mountain, North Carolina. The additions include a maintenance shop, now under construction, and enlargement of both office and laboratory facilities. Other improvements in processing equipment are expected to increase operating efficiency but will not materially affect the total plant capacity.

The first of five new titanium making furnaces has been placed in operation by *Mallory-Sharon Titanium Corporation* as a part of its $4,500,000 expansion program that will double present capacity by 1957. *Sharon Steel Corporation* and *P. R. Mallory & Company, Inc.*, are joint owners of the firm. When the last of the furnaces is placed in operation in the early part of 1957, the melting capacity will be 500 tons per month, or 6,000 tons annually.

Interlake Iron Corporation has acquired the assets of *Globe Iron Company* of Jackson, Ohio in an exchange of stock. A proposal has also been made to exchange Interlake stock for the publicly held stock of *Globe Metallurgical Corporation* of Beverly, Ohio. The acquisition will enable Interlake to produce a broad range of ferro-silicons, including silvery iron, ferromanganese, ferrochrome, and other special alloys.

Zonolite Company has built a new ore processing plant at Kearney, South Carolina near the center of the company's southern ore deposits to permit full development of reserves in the area. Until this plant, production of vermiculite in the southeast had depended upon the processing of relatively high-grade ore at the plant at Travelers Rest. The firm has also gradually acquired or leased additional deposits of lower grade ore which contain substantially larger tonnage reserves.

The *American Smelting and Refining Company's Eastern United States Division* has opened new offices in Knox-

ville Tennessee. Deane F. Kent is exploration supervisor in charge of this office.

IRON RANGES

The *Oliver Iron Mining Division* of the *U. S. Steel Corporation* announced recently the opening of two new open pits on the Mesabi Iron Range. They are the *Stephens* property at Aurora, Minnesota, and the *Saundry* property at Virginia, Minnesota. Stripping of overburden is under way at both pits.

W. S. Moore Company of Duluth, Minnesota has taken option on some magnetite properties in the area around *Benson* mines of *Jones & Laughlin Steel Corporation*. The property is presently owned by the *Newton Falls Paper Company*. The tonnage available will be determined by drilling and if sufficient tonnage is discovered, production will be undertaken during 1958.

The *Hunner* mine of *M. A. Hanna Company* went into production shortly before the steel strike commenced. The plant originally is producing straight wash ores as the heavy media section was just completed and the cyclone treatment section will be completed later in the fall. This plant was constructed with the use of some of the equipment from the *Buckeye* mine of M. A. Hanna, which is not being mined at the present time. The plant is located at Coleraine, Minnesota.

Jones & Laughlin Steel Corporation has started exploration work on its newly acquired lands at Butternut, Ashland County, Wisconsin, Preliminary geographical surveys on this area indicated the possibility of economic quantities of magnetic iron formation which might be recovered by open pit mining. These ores are so called "low grade" ores or taconites, which, if present in sufficient quantities and if amenable, may be concentrated for blast furnace use. Little detailed exploration work has been done on these properties although the magnetic attractions have been known for many years. The bedrock in the area is covered by 100 to 200 feet of glacial drift which has ruled out the possibility of test pitting the area and there are no visible outcrops of the iron formation. If preliminary exploration results are favorable, extensive drilling is planned for 1957.

Marquette Mining Company's new *Eagle* Mill agglomerating plant in Michigan has started producing iron ore pellets. Marquette is owned by *Cleveland-Cliffs Iron Company* (47% percent), *Jones & Laughlin Steel Corporation, Wheeling Steel Corporation, Inland Steel Company,* and *International Harvester Company*. Cleveland-Cliffs officials estimate that if there hadn't been a steel strike, the output from the Eagle mill this year would have totaled 200,000 tons. Development of Marquette's *Republic* mine is proceeding satisfactorily.

Many of the Great Lakes fleet owners took advantage of the strike period to place their ore carriers in drydock for repair and inspection instead of waiting for the close of the navigation season.

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Erie Mining Company has contracted with *Linde Air Products Company*, a division of *Union Carbide and Carbon Corporation*, for a new large volume, low cost oxygen supply system which will provide gaseous oxygen for jet piercing machines at the Aurora, Minnesota, taconite operations. The system, representing a new concept in oxygen supply systems, will consist of two units. A huge gaseous oxygen producing plant, to be owned and operated by Linde, will pump its output into pressure trailers which, in turn, will feed jet piercing machines in the pit. The second unit, a Linde liquid-oxygen system, will back up the producing plant in order to supply oxygen during any plant shutdown, and provide oxygen for surge demands which result from a multiple oxygen consuming operation like jet piercing.

The U. S. Bureau of Mines has granted its "Sentinel of Safety" awards to the *Zenith* and *Erie* iron mines. The Zenith, a *Pickands Mather & Co.* property operated by *Vermillion Mining Company*, received the award for underground metal mines. It worked 529,373 man-hours without a disabling injury. The Zenith is a three-time winner, having won the trophy in 1935 and again in 1954. The Erie, a Pickands Mather & Co. property operated by *Erie Mining Company*, received the award for open-pit mines. It worked 558,010 man-hours without a disabling injury.

Total Lake shipments of iron ore from United States ports through June 30, 1956 amounted to 30,075,431 long tons compared to 26,933,081 for the same period during 1955. Included in the above total is the shipment of 606,876 gross tons of ore from the new port of Silver Bay, Minnesota.

A research project to find an economical method of producing useful concentrates from non-magnetic taconite on the Mesabi Range was recently announced by the *Great Northern Railroad*. John M. Budd, G.N. president, said the railroad will cooperate with the University of Minnesota and the University of North Dakota in the project, and will work closely with the Minnesota Mines Experiment station "which, under the leadership of Prof. E. W. Davis, contributed so conspicuously to the development of a successful processing method for the Mesaba's magnetic taconite." G.N.'s interest will be confined to research, and the railway would not be identified with any pilot plant development as a result of the study. "The University of North Dakota will be prominently identified with the research," said Mr. Budd, "because of the possibility that lignite, available in a great quantity in that state, may have a part in determining a process for utilization of non-magnetic taconite, which is in vast supply in the western part of the Mesabi."

After a detailed study of injury statistics from eight operating companies, the Bureau of Mines has found that unsafe practices cause about three-fourths of all lost-time accidents reported in underground Lake Superior iron ore mines. The principal unsafe practices were failure to follow instructions or established procedures; needless exposure to hazards; and failure to correct known hazards. Principal unsafe conditions cited were defects in or failure of equipment, loose ground, and lack of guards or safety devices.

ARIZONA

Inspiration Consolidated Copper Company announces that tentative plans have been made for location of the production shaft, treatment plant, and townsite for the *Christmas* mine near Winkelman, Arizona. Deepening of the development shaft to the 1,400 level has been completed, and intermediate levels are being driven to provide ventilation and to develop ore lying north of the shaft. In addition, a drift from the 1,400 level has been started to develop the O'Carroll ore bed south of the shaft. The diamond drilling program is being continued with emphasis on the higher grade primary ore showings. At the adjacent *New Year* group of claims, drilling has been started, following aerial surveys, geologic mapping, and the preparation of roads and drill sites. These claims were optioned by Inspiration last year in the belief that the favorable geologic structure underlying the Christmas mine extends through the New Year property. Development costs during the first half of 1956, Inspiration reported totaled $553,908.

Clearing of approximately 25 acres of ground as the site for its smelter has been started by *Ray Mines Division, Kennecott Copper Corporation*, at Hayden, Arizona. The smelter is to be constructed northeast and adjacent to the company's Hayden mill. Contract for construction of the new smelter was awarded to *Western Knapp Engineering Company* of San Francisco. The smelter will have a monthly capacity of approximately 25,000 tons of copper concentrates. The amount of the Western Knapp contract was not diclosed, but the company previously announced its plans for spending $40,000,000 for the smelter and expansion of the mill at Hayden, and extension of the open-pit mine at Ray. F. G. Woodruff of Kennecott's Western Mining Divisions Engineering Staff has been named project manager for the smelter construction.

The *Oneida Mine Corporation* has taken over the *Rattlesnake* mercury mine in the Sunflower district of Arizona. Thomas Oelich of Mesa is in charge and has a crew of eight men employed.

The *San Manuel Townsite Company* has announced that homes in San Manuel, Arizona, are being offered for sale to employes of *San Manuel Copper Corporation*. Housing in the San Manuel townsite of 1,000 homes has been operated on a rental basis up to this time, and the company emphasised that the present plan is to sell the houses only to the present renters. All sales will be handled with FHA financing.

Inspiration Consolidated Copper Company, Inspiration, Arizona, reports that re-equipment of its concentrator is proceeding on schedule with much of the heavy equipment installed or on hand, and that good progress is being made in the work on other necessary facilities including tailing disposal and water supply. Conversion of Inspiration's metallurgical plant to the so-called "dual process" is being accomplished at an estimated cost of $5,660,000. When completed, probably late this year, the company will have excess capacity in the electrolytic tank house, and this capacity will be employed to refine anode copper produced from the dual process copper concentrates. Work has started on the installation of the necessary equipment.

Regular shipment of uranium ore has begun from *Golden Crown Mining Company's Orphan* mine located 1,100 feet down the side of the Grand Canyon in Arizona. Ralph G. Brown, president, said the ore is being sold under contract to *Rare Metals Corporation of America*, a subsidiary of *El Paso Natural Gas*, for processing in its new mill at Tuba City, Arizona. Ore from the Orphan mine is brought to the rim of the Grand Canyon by an 1,800-foot aerial tramway and then trucked 92 miles to Tuba City.

The *Golden Crown Mining Company* plans to drill its *Brown-Henderson* lead-zinc-copper property adjoining the *Shattuck Denn Mining Company's Iron King* mine at Humboldt, Arizona. The company's *Arizona-Indiana* property 35 miles northwest of Tucson is shipping some lead and silver ore. Drilling is being conducted here to check a parallel unexplored vein.

Jack Gordon of Silver Bell, Arizona is making shipments from the *Maggomigal* group of 21 unpatented claims which he discovered. The claims contain predominantly copper, with some traces of other minerals.

The U.S. Bureau of Mines has issued a supplementary report on 18 asbestos claims in Arizona which have been examined by its personnel. All of the deposits are on unpatented mining claims, and most are on unsurveyed land. Their approximate locations are shown on several maps in the report. The information is contained in Information Circular 7745 by Lincoln A. Stewart.

The *Transvaal Mining Company*, which owns a number of claims in the Cumpas district of Arizona, is rehabilitating some of its old properties for possible future ore shipments. Stopes are being cleaned out and some blocking out of old ore zones is under way. Most of these properties were former copper prospects.

CALIFORNIA

The merger of the *United States Potash Company* and *Pacific Coast Borax Company* has resulted in a new name—*United States Borax and Chemical Corporation*. Four operating divisions have been created. The Pacific Coast Borax Company division will carry on borax manufacturing and sales in the industrial field under J. F. Corkill, vice president and general manager of that unit. The United States Potash Company division will be responsible for production and sale of potash under Dean R. Gidney, vice president and general manager. The 20-Mule Team Products division will handle sales and advertising of household products, headed by vice president D. V. Parker. Research activities have been organized as a separate division with G. A. Connell as vice president and Dr. D. S. Taylor as director. J. M. Gerstley is president of the firm.

Sonoma Quicksliver Mines, Inc. of Guerneville, California, has received a DMEA loan of $77,900 for exploration for mercury in Sonoma County. The government's share in the project is $58,425.

Stockholders of *Surcease Mining Company* which owns and operates the *Atolia* tungsten properties in San Bernardino County, California have decided to sell their interests therein. While such a move has been under contemplation for some time, the recently extended government tungsten purchase program should extend the operating life of the properties and the opportunities therein for any prospective new owner. No interruption in continuity of operations is in-

Morenci Switches to Diesel-Electric Haulage

A view of one of sixteen, 1,750-hp., Diesel-electric locomotives now in use at the Morenci open-pit mine of Phelps Dodge Corporation at Morenci, Arizona, is shown above. Thirteen of these Diesel-electric locomotives were purchased and put into use at the mine late last year, replacing trolley-electric locomotives formerly used. The introduction of the 1,750-hp. locomotives has made possible longer trains (10 cars in place of eight) and faster train cycles. The result has been to increase the tons of ore and waste hauled per day. Substantial savings in haulage costs are expected as a result of the replacement. L. M. Barker is manager of the property, which also has a 50,000-ton concentrator and smelter.

volved in this decision or is expected under prospective change in ownership. Properties involved are mainly those formerly held by the *Atolia Mining Company*. Operations are based primarily on blockleasing. The properties have been producing continuously for 50 years, 12 of which under present ownership.

Consolidated Nicholson Mines of Vancouver, British Columbia, Canada is reported to be considering rehabilitation of an old copper property in northern California about 35 miles southeast of Medford, Oregon. Investigations to date are said to show a reserve of 200,000 tons of ore assaying 3.62 percent copper, including a large dump stockpile. The old workings could be reopened, and the property readied for production within six months, according to J. D. Mason, vice president.

Upper Paradise Mines Association, Inc. has secured a block of black sand leases in Kern County, California and reportedly plans to have *H. A. Shiffer Associates Inc.* of Los Angeles operate the property by dredging.

The *Crescendo Mining Company* and the *New York Milling Corporation* of Las Vegas, Nevada have joined the *Western Uranium Corporation, Trinity Oil and Gas Company Inc.*, and *Tacks Oil Corporation* in acquiring all of the *Dorr* mining properties in the New York Mountains of San Bernardino County, California for a price in excess of $500,000. The property is said to contain copper, manganese, and uranium, as well as a large tungsten deposit. Present plans call for construction of a 200-ton mill to handle company ores and custom milling.

West End Chemical Company and *Stauffer Chemical Company* have agreed upon a merger plan by which West End will be absorbed into Stauffer through an exchange of stock. West End Chemical Company produces borax, soda ash, salt cake, and lime at its plant at Searles Lake, California. For more than 25 years Stauffer has been exclusive sales agent for this borax. Under the new organization, West End will continue to operate as an autonomous division of Stauffer under the designation of West End Chemical Company Division of Stauffer Chemical Company.

One of the few remaining gold producers in California is the *Hazel Creek* mine 15 miles east of Placerville in El Dorado County. The ore is mined by shrinkage stopes above a 500-ft drift driven off a 100-foot inclined shaft. Amalgamation and flotation are carried out in a 30-ton mill.

New Idria Mining & Chemical Company of Idria, California has acquired two oil companies in an exchange of stock. The firms are *Beaver Petroleum Corporation* of Wilmington, Delaware and *Laan-Tex Oil Corporation* of Dallas, Texas. The leases acquired are in Texas, California, and Kansas.

National Tungsten Corporation has acquired the 1,780-acre *Tyler* tungsten mine near Porterville, California, complete with mill, and has also added a second producing tungsten property near Fresno to its holdings. In two areas of the Moab region of Utah, the firm has also taken over 22½ uranium claims.

The *California Division of Mines* has issued a special report "Radioactive Deposits in California," describing California's uranium and thorium deposits in greater detail than has been published to date. Written by geologists of the *United States Geological Survey* for the *United States Atomic Energy Commission*, the 38-page report lists all occurrences of radioactive minerals known to the AEC up to the first of last year. Ninety-two are shown on a map, and a large number are described in detail. Copies may be obtained by mail from the Division's offices in the Ferry Building, San Francisco 11, or over-the-counter at other Division offices for 50 cents plus tax.

NEVADA

Anaconda Company has signed a lease and option on the Hall molybdenum property in the San Antone Mountains about 24 miles north of Tonopah, Nevada. The property is owned by Clarence Hall of Bishop, California and Lee Hand of Tonopah. Anaconda has been mapping the property for several months and will now diamond drill. *Boyles Brothers* are doing the exploratory drilling, while *Isbell Construction Company* constructed the access roads.

Kollsman Mineral and Chemical Corporation, owner of the *B & B* quicksilver mine in Fish Lake Valley, seven miles east of Mt. Montgomery, in Esmeralda County, Nevada, is busy rehabilitating the property. Eleven miles of access road have been constructed to the property which is at 8,000-foot elevation. A treatment plant is about 80 percent complete, and the camp facilities have been erected. The treatment facilities consist of a crushing plant which reduces ore to minus-$\frac{3}{16}$-inch, a large retort furnace, an 850-ton steel ore bin, and a 600-hp. diesel power plant. Mining will be by open pit, with bulldozers and slushers.

Titanium Metals Corporation of America is reported to be in process of acquiring a 15-year lease on the plant properties of *Pioche Manganese Company* at Henderson, Nevada. This would include the water, power, and utility rights of Pioche. The additional 75 acres would bring Titanium's holdings to 300 acres, making it one of the largest plants in the area.

Nevada Scheelite Corporation, a subsidiary of *Kennametal Inc.*, has received a $68,800 DMEA loan to explore for tungsten in Mineral County, Nevada. The government's share of the project amounts to $51,600.

Consolidated Virginia Mining Company has decided to resume operations on the historic Comstock Lode at Virginia City, Nevada, after a 14-year shutdown. The company's exploration program includes drilling and open-cut operations in virgin areas, and sampling and metallurigcal work to confirm previous assays. The program is being undertaken as the result of recent examination of the properties and exhaustive research of documented reports, many not previously known to exist. Also being undertaken is sampling of the huge dumps on the property which were accumulated in early mining days. Arrangements have been made to test a new recovery method with the objective of recovering gold and silver. The Comstock Lode was first discovered in 1859 and saw its most feverish activities in the 1870's. Con-Virginia's properties were worked on the upper levels by various lessees from 1925 to 1936, and in 1939 the company erected a 100-ton flotation plant to process ore from an open pit. This continued until 1942 when a wartime government order (WPB L-208) stopped all gold mining.

Apex Uranium made its 22nd shipment of 65 tons of uranium ore to the *Vitro* mill at Kalunite siding, Utah in July, and then drastically reduced shipments until development work is completed. For the present, all work will be concentrated on driving Tunnels 1 and 2, and completing development for increased production. The Apex property is in the vicinity of Austin, Nevada. The firm also has a copper property which it is continuing to bulldoze.

The extension to the government's mineral purchase program has revitalized western mining. *Getchell Mines, Inc.* officials at Red House, Nevada wasted no time in swinging into tungsten production on a 24-hour basis. The new law calls for the purchase of 1,250,000 units of tungsten by December 31, 1958; limitation of 5,000 units per month from any single producer from any single mining area; and continuation of fluorspar, asbestos, columbium, and tantalum purchases.

The *Hazel E. Mining Company* has sold some of its property in the Ione mining district of Nye County, Nevada to a California group headed by C.H. Rodgers and H.C. Passmore. Core drilling has started. The part of the property sold is called the *Hazel E.* group; another group on the same fault known as the *Idlewild* has been retained by the company.

Leonard Traynor has reopened the *Tonopah King* mine, previously known as the *Summit King* when it was operated by the *Tonopah Development Company* several years ago. He is making shipments of ruby silver ore to the *Kennecott Copper Corporation's* smelter at McGill, Nevada.

The *L & N Mining Company* of Battle Mountain, Nevada is currently developing its copper property in the Battle Mountain area. The firm was formed by W. J. Logus of Seattle, Washington, who is president of *Vindicator Silver-Lead Mining Company* of Wallace, Idaho, and Vincent R. Newbury of Battle Mountain, who is vice president of *Silver Mountain Lead Mines* of Wallace. The properties now held by right of location consist of 45 unpatented claims and a fractional patented claim under lease with option to buy. They are located in Lander County in a part of the Battle Mountain Range. Approximately five miles of access road have been constructed, and prospecting trenches have been bulldozed. The latter reportedly disclosed copper ore.

George H. Salmon, president of the *Metals Exploration Corporation* of New York City, has formed three mining corporations in Nevada—*Mercury Corporation of America, Tungsten Corporation of America,* and *Perlite Corporation of America.* Installation of a mercury recovery plant in the center of five groups of cinnebar claims is the plan. According to Mr. Salmon, none of the groups is large enough to operate profitably alone, but together they can keep a large plant in production. The properties are in Pershing County, Nevada. Negotiations are underway for purchase of the Toy tungsten plant, and reportedly Mr. Salmon has leased 10 claims owned by Ed. Bottomly in the Ragged Top district. The perlite operation will depend upon the outcome of the Navy's plans for obtaining the *Cow Creek* deposits as part of its gunnery range.

According to the United States Geological Survey, ground-water levels declined to new record lows in most wells in the Grants-Bluewater, New Mexico area during 1955. This is of particular concern to uranium mills in the area. *Anaconda Company* has bought many ranches for their water rights, and *American Metals Company* recently paid $400,000 for a ranch for similar purposes.

St. Anthony Uranium Corporation is reported to be working on plans for mining on the *Seboyeta* grant a few miles north of *Anaconda Company's* famous *Jackpile* mine. St. Anthony is owned by *Climax Molybdenum Corporation.* The firm has been drilling in an area adjoining the Ambrosia Lake region.

Title to potentially uranium-rich land in McKinley County, New Mexico has apparently been settled. U. S. District Court Judge Waldo Rogers has awarded the rights to *Sabre-Pinon Uranium Company* in a suit brought by G. P. Roundee and Forest Ives, of Grants, contending that when the government granted lands to the railroads, mineral rights were reserved. The land in question was leased by the *Santa Fe Railway Company* to Sabre-Pinon. Immediately following the judge's decision, he undertook a federal suit brought by Sabre-Pinon against Roundee and Ives. The allegation was that Roundee and Ives staked claims on two sections of land under lease by *Sabre Uranium Corporation* and *Pinon Uranium Corporation.* Sabre Uranium claims to have spent a million dollars on development in the area.

The first Uranium Metal Trades Council in the United States has set up headquarters in Grants, New Mexico. The Council, recently organized in Albuquerque, will be chartered by the Metal Trades Department of AFL-CIO, and is being established at Grants by employees of *Anaconda Company.*

For the first time in years, copper production in New Mexico has jumped ahead of potash. State Mine Inspector John Garcia, now working up his annual report, estimates copper valuation for the past fiscal year at $60,000,000, about $10,000,000 above the previous year's figure. Potash production will stay at around $50,000,000, and uranium, for which more figures are becoming available, will show around $24,000,000 production valuation as compared to $4,000,000 the previous year.

The *Columbian Mill and Mining Company, Inc.,* of La Maderia New Mexico has reopened the *Francis No. 2* mine. Mica will be first consideration, columbite second. This is in the Rio Arriba County Mica district.

Phillip Fidel of Santa Fe, New Mexico has started to mine mica near Cordova, in Rio Arriba County.

H & W Minerals has registered a uranium mining project in Catron County, New Mexico. It has leased the property to *3-11 Mining Company* which also plans to mine vanadium, gold, and silver. The property covers 11 *Baby* group claims on Mineral Creek in the Cooney mining district. Willis Kotwica, in Glenwood, is in charge. James R. Wray of H & W Minerals is general manager.

Some 11,875 acres of land in the Bluewater area were opened to claim location on August 31. The land had been withdrawn for the Atomic Energy Commission, but the Interior Department has revoked the withdrawal. Not all the land is open, however, because some of it is privately owned and some is covered by prior mining claims. Prospective prospectors should check with the Bureau of Land Management, Santa Fe.

Phillips Petroleum Company's Strategic Minerals Section has established an office in Albuquerque, with D. W. Clark, district geologist, in charge. The firm has been doing some exploratory drilling near the Ambrosia Lake district in a joint venture with *Holly Minerals Corporation*.

A preliminary injunction issued by Judge Clyde C. McCullough, first Judicial District, enjoins Paul Coupey of Grants, New Mexico and others, including *Jebson Mining Company* of Grand Junction, Colorado, from entering and overstaking claims in the Ambrosia Lake region of McKinley County. The judge held that *Ranchers Exploration and Development Company* possessed the claims and was carrying on exploration in good faith. In a similar action filed by Ranchers, the court entered a permanent injunction against Russell Benedict and others. As to the first case there has been a variance in interpretations of the law, some believing that the first prospector to expose ore had a right to the property.

Yucca Uranium, Inc. and *Falcon Uranium Corporation*, both of Albuquerque, New Mexico, are now one, since Yucca purchased the entire assets of Falcon. These included 10,000 acres in uranium claims in McKinley County. *Mercury Uranium & Oil Company*, subsidiary of *Anderson Development Corporation*, is currently drilling on one of the Falcon claims. As a result of the purchase, Frank Farkas of Albuquerque, who was Falcon's chairman of the board, is now on Yucca's board of directors.

American Metal Company, Ltd., which is associated with *Sabre-Uranium Corporation* in a uranium mining and milling project in the Ambrosia Lake region, and which is negotiating with the Atomic Energy Commission for a concentrate contract, has competition. *Shattuck Denn Mining Company*, which has operated a fluorspar mine at Grants and owns a fluorspar mill at Los Lunas, has made a proposal for a uranium mill at Los Lunas. There are rumors too, that other firms are interested.

Because of a declining demand for fire-refined copper, the Chino Mines Division of Kennecott Copper Corporation has shut down its fire refinery at Hurley, New Mexico. With a large amount of refined copper stockpiled at the company's New Mexico plant, Kennecott is now casting all its output of metal as "blister" copper at the present time. Company officials emphasized that if market condition improve the refinery can be put back into operation quickly. None of the refinery's 65 employees has been laid off. The employees are being assigned to other jobs in the smelter for the time being. Seasonal slackening of demand for copper plus a steadily increasing supply of the metal recently caused declines in the price of copper.

Underground exploration for copper is being conducted in Luna County, New Mexico by the *Stinson Group*, with W. W. Rockwell of Deming in charge.

The *Uranium Corporation of America* has changed its name to *Malco Exploration Company, Inc.* New directors are: Bryan D. Beck, Jr. of Beaumont, Texas; James Currie, Fort Worth, Texas; Ben J. Rogers, Beaumont; A. O. Trigo, Dallas, Texas; and Dr. Samuel R. Ziegler. Two other directors were re-elected: Malcolm I. Cole, president, and Margaret L. Cole, of Los Alamos, New Mexico.

Anderson Bros. Company, one of the early operators in the Ambrosia Lake uranium district, has transferred its interests to Paul E. McDaniel, of Houston, according to reports. In return, Anderson Bros. received blocks of stock in several uranium companies, including *Pacific Uranium Corporation*, headed by R. E. Roberts, of Los Angeles; and *Ranchers Exploration and Development Company*, headed by B. C. Ringer, Albuquerque. Anderson Bros. property and equipment in Texas, Minnesota, Wyoming, New Mexico, Montana, and Louisiana were transferred to McDaniel.

Holly Uranium Corporation has changed its name to *Holly Minerals Corporation*. Its operations are located in the Grants area of New Mexico; Stibnite, Idaho; and Pampa, Texas. Subsidiary companies are *American Fiber Corporation* of Globe, Arizona; and *Minas de Acebo* of Sonora, Mexico.

The *Magnetite Products Corporation* has 25 men working at an open pit mine near Capitan, New Mexico, complete with power shovels, special dumper machines, and crushing equipment. The ore is Magco (result of a fairly new process), a heavy ore aggregate used for coating underwater pipelines and transmission lines. The pipe has to weigh 4.25 times as much as water. Magco was formerly produced in Canada by Magnetite, which is said to be the only company in this country producing the product. Paul Brenton is president and general manager; Parr Merriman, secretary-treasurer; both are from Florence, Colorado.

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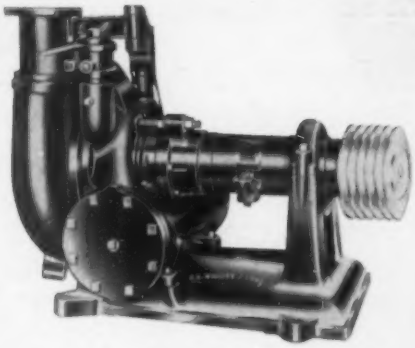

1. Maintained High Efficiency
Wilfley's take-up adjustment allows maintained high efficiency throughout the life of the parts.

2. Low Maintenance Cost
The unique Wilfley design and rugged construction make little or no maintenance a reality.

3. Quick-Change Features
Absolute minimum downtime is required to change worn parts.

4. Interchangeable Metal or Rubber Parts
A selection of the right combination of rubber or hard alloy iron parts can be made to solve your pumping problems.

Wilfley Acid Pump
"COMPANIONS IN ECONOMICAL OPERATION"
Wilfley Sand Pump

Individual Engineering on Every Application

Write, wire or phone for complete details.

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